ENVIRONMENTAL ASSESSMENT BOARD

Ontario

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 56

DATE: Wednesday, September 11, 1991

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

EARR & ASSOCIATES REPORTING INC.

(416) 482-3277

2300 Yonge St. Suite 709 Toronto, Canada M4P 1E4

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, on Wednesday, the 11th day of September, 1991, commencing at 10:00 a.m.

VOLUME 56

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

S T A F F :

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MS. C. MARTIN	Administrative Coordinator
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J.C. SHEPHERD) I. MONDROW) J. PASSMORE)	IPPSO
R. WATSON) A. MARK)	MUNICIPAL ELECTRIC ASSOCIATION
S. COUBAN) P. MORAN)	PROVINCIAL GOVERNMENT AGENCIES
C. MARLATT) D. ESTRIN)	NORTH SHORE TRIBAL COUNCIL, UNITED CHIEFS AND COUNCILS OF MANITOULIN, UNION OF ONTARIO INDIANS
D. POCH) D. STARKMAN) D. ARGUE)	COALITION OF ENVIRONMENTAL GROUPS
T. ROCKINGHAM	MINISTRY OF ENERGY
B. KELSEY) L. GREENSPOON) R. YACHNIN)	NORTHWATCH
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M. MATTSON) D. CHAPMAN)	ENERGY PROBE
A. WAFFLE	ENVIRONMENT CANADA
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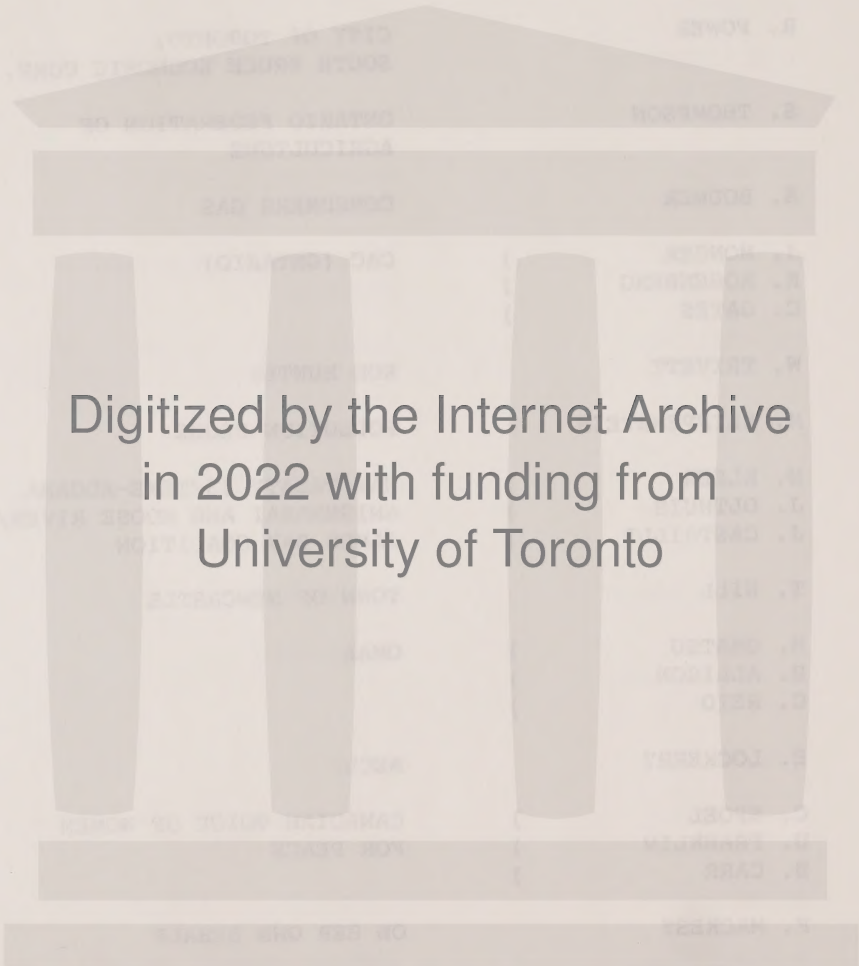

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L I S T o f E X H I B I T S

---Upon commencing at 10:10 a.m.

THE REGISTRAR: Please come to order. This hearing is now in session. Be seated, please.

THE CHAIRMAN: Mr. Greenspoon?

MR. GREENSPOON: Excuse me for a moment.

---Off the record discussion.

MR. GREENSPOON: I had given notice of using a half a dozen interrogatories. Mr. Campbell indicated that he didn't have them and now he says he does.

MR. B. CAMPBELL: My witnesses have them, more importantly. I don't, but I can struggle through. It's a little more difficult for them.

MR. GREENSPOON: Mr. Nunn kindly made five extra copies. Perhaps I will give one to Mr. Campbell.

THE CHAIRMAN: Are there any additional exhibits you want to file before we start?

MR. GREENSPOON: No, sir. There are, I think, four additional exhibits I have given notice of, and I think as they come in -- I have spoken with the clerk and I have agreed that I will make sure he understands what it is I am talking about, which exhibit.

THE CHAIRMAN: Thank you.

MR. GREENSPOON: There is one further interrogatory that I may use as well, but I have got copies of it as well.

PAUL JONATHAN BURKE,
AMIR SHALABY,
MARION ELIZABETH FRASER,
LYN DOUGLAS WILSON,
WILLIAM OSBORNE HARPER,
IAN DUNCAN MacLELLAN; Resumed.

CROSS-EXAMINATION BY MR. GREENSPOON:

Q. Panel, I would ask you to turn to page 7-11 of the Plan, Exhibit 3, I guess, technically. 7-11. The two figures 7-5 and 7-6 on that, I just wanted to confirm that those are accurate representations of use and growth. For my purposes, for my clients, if we group the northeast and the northwest together, 13 per cent of the electricity in this province is used north of Highway 17, north of the TransCanada Highway, if we could use that reference point?

MR. BURKE: A. I believe the data refers to 1987 and I believe it was correct at that time.

Q. Right. Presumably, if you look at Figure 7-6 it will decline, that 13 per cent will get less each year because the rate of growth in the northeast and the northwest are smaller than the rates of growth. You are the mathematician, Mr. Burke, you

are nodding your head in the affirmative?

A. That's correct.

Q. So, in the future we in the north will be using less and less, relatively, of the electricity produced in this province?

MR. B. CAMPBELL: I'm sorry, the figure that was being referred to was 7-6?

MR. GREENSPOON: 7-5 and 7-6.

MR. B. CAMPBELL: When I read the title on 7-6, I'm sorry, it's '83 to '87, it's not future.

MR. GREENSPOON: Yes. Okay.

MR. BURKE: I think that --

MR. GREENSPOON: I wonder if at this point, I don't want to be finickity, but I mean, I don't think that's an objection to a question. I wish Mr. Campbell wouldn't try to clarify my questions. I am not trying to be difficult, but the figure speaks for itself.

MR. BURKE: Can I just clarify then my response--

MR. GREENSPOON: Sure.

MR. BURKE: --which is that certainly if the growth rates for northeast and northwest are below the average for the province, then their share will decline.

I believe our forecast for the northwestern region is not that it is below the average for the province; it is in fact at or above the average for the province.

The northeast, however, is below the average for the province.

Off the top of my head, I am not sure whether we have given you an interrogatory already, whether or not the combined growth rate for the northeast and northwest long term is below the average for the province.

As I say, I am pretty comfortable from my memory that the northwest we expect to grow at or above the average of the province and the northeast below the average for the province. And where the combination of the two net out long term, I can't say offhand if that's important to you. I think there is an interrogatory that addresses that and I can look it up for you.

MR. GREENSPOON: Q. You would agree that the most demand management potential is in the south?

MR. BURKE: A. As a proportion of load or just in aggregate, absolute terms?

Q. Yes, in both.

A. Well, I am not sure that I can say as

a proportion of the load. But in absolute terms clearly the potential is larger in the south.

Q. The principle that small increments in savings in efficiency, given the multiplying factor of the way electricity is sold, there are so many kilowatts sold, this is probably in your area, Ms. Fraser, that if you have a 95.7 per cent efficient motor, and you have a 98.5 per cent efficient motor, that 1 per cent is very significant.

MS. FRASER: A. Yes, given that there are so many motors in the province.

Q. Or given if that motor that we are talking about is a 750 horsepower motor.

A. Yes, although usually large motors are made to order and they are generally, fairly efficient to start with.

Q. Yes, you said that in direct but that doesn't answer my point. My point is, obviously a 97.5 per cent efficient motor is very efficient, but a 98.5 efficient motor, that 1 per cent, if it's a 750 horsepower motor is very significant in terms of kilowatthours.

A. I'm not good at doing that conversion quickly. But, yes, more efficient equipment is more efficient equipment.

Q. Would you just turn to Exhibit 196, page xvii.

Perhaps at this point I will be using number of these Competitek Executive Summaries, Mr. Chairman, and perhaps I will just -- because I know that Ms. Fraser is familiar with this institution, I will just ask a few background questions before I get to the question I was going to ask Ms. Fraser.

You mentioned, I think you quoted Amory Lovins in your direct evidence.

A. Yes, that was a quote from Competitek.

Q. Competitek.

A. An introduction by him.

Q. Right. I see those three red volumes between Mr. Burke and Mr. Wilson.

A. Correct.

Q. And those are the Competitek volumes?

A. Those are they.

Q. And Hydro is a subscriber to Competitek?

A. Yes, we are.

Q. And it's a loose-leaf journal that's updated as much as we lawyer know legal reports are updated in loose-leaf services?

A. Yes. I believe it's updated quarterly because technology changes pretty quickly.

Q. And it is a rather unique journal, a rather unique service, would you say, unique from a North American or global perspective on energy efficiency?

A. It's unique in that it puts together lots of information on new technologies that's basically pushing back the frontiers with respect to efficiency. So, it's very valuable from that point to see what is coming over the horizon.

Q. Right. And there is nothing else like it, I take it?

A. The Lawrence Berkeley Labs do a lot of research documentation. It is not presented in the same comprehensive kind of way. The Electricity Power Research Institute do a lot of research as well.

But I would have to agree in terms of three volumes that hit the main technologies that we are dealing with in terms of electrical efficiency, we certainly refer to it when we are developing programs and looking to see what the highest level of efficiency can be.

Q. And most of the Lawrence Berkeley and EPRI stuff is in there? ...

[10:22 a.m.] A. It's often cited, yes.

Q. Often cited. The Lawrence Berkeley materials are often more into the future, more speculative, more uneconomic, or at least as Mr. Burke would say, not proven to be economic in his forecasting test?

A. Yes. More of laboratory kind of results.

MR. BURKE: A. Not to put too fine a point on it, I do think Lawrence Berkeley does a lot of work that has to do with technologies that are very close to the market and are, for instance, used in appliance efficiency standard type assessments.

Q. Now, sorry, going back to that exhibit then, page roman numeral 17, just talking about the motors in the first paragraph, do you agree with the third sentence there, Ms. Fraser, starting: Almost uniquely, among energy-using devices, a typical industrial motor requires electricity annually - in italics - costing approximately 10 to 20 times its own capital cost?

MS. FRASER: A. I think our numbers are probably a little bit less, given that we have a bit lower electricity rates, but definitely that the energy consumption of a motor is certainly a lot more in

dollar terms than in terms of capital cost.

Q. So, getting back to the 1 per cent efficiency gain, it is significant. I guess my point is, if you are going to put a motor in and there is a 97.5 and a 98.5, put the 98.5 in?

A. Assuming that the load factor of the motor is such that it would pay you back in the lifetime of the motor, yes.

Q. Well, but if a motor is ten times, ten to twenty times annually its capital cost, how can it but not do that?

A. There is the odd motor that doesn't get run very often, at all, but...

Q. The odd motor?

A. (Nodding head)

Q. Yes, okay.

MR. BURKE: A. Well, actually, there is quite a distribution in motor use in practice, and certainly in large process industries, they tend to have high load capacity factors, but there are a very large number of motors that have low capacity factors. They tend to be in the smaller motor size ranges.

Q. Well, if you look at Interrogatory 1.6.53, page...

I see that I have gratuitously marked it

up with a star. That is the second last page. This was an answer to a question about motors and you say, "Motor systems, as such, are not analyzed in any sector," and I think that came out in Panel 1.

A. Sorry?

MS. FRASER: A. I can't find the reference.

MR. BURKE: A. I can't find it.

Q. Interrogatory 1.6.53?

A. Yes. Where in 1.6.53?

Q. Page 3. I'm sorry. On the left-hand side, (b): Process level assumptions, rather than end-use equipment underlay industrial sector analysis.

A. Yes.

Q. Motors systems, as such, are not analyzed in any sector. And I think it was clear from Dr. Buja-Bijunas's evidence that that is the case, that you do not go out and analyze motors in every sector.

A. What we said was that the in-depth end-use load forecast is a process modelling system and that the motors that are part of the processes are looked at from the perspective of do they have potential for efficiency improvement and so on. But it is really the process as a whole that is analyzed in that particular end-use load forecasting system.

That does not mean, at all, that people who have looked at the potential for industrial EEI in specific industries and there are, I think, six reports that were filed in response to Interrogatory 4.7.4, I believe the number was, that document the assessment of potential induced EEI, and in those studies, they looked quite specifically at motors in those industries to determine their potential for induced EEI.

I think the issue, if there is an issue, is that the basic load forecast has not got a comprehensive assessment of all motors in the province. We have really tended to focus on the opportunities for efficiency improvement in specific industries rather than try to have a comprehensive data base on all motors in Ontario.

It would be very nice if such a data base existed, but it doesn't and in the face of the existing data set, we have focused on specific high-intensity or large-using, electricity-consuming industries, and we have looked at the EEI in those industries and we have developed process models for those industries and in those process models, consideration is given to whether or not more efficient motors might reduce process use in future.

Q. All right. I will ask some more

questions about motors later.

The next kind of related issue I wanted to ask you about was kind of a corollary, I guess, to that issue of the percentages, the small increments and how significant they could be, and that is that usually, it is the cutting edge and the latest technology that has the highest efficiency; that it is rare that a new product - I mean maybe it is so obvious it is not even worth talking about - but whatever is the latest technology is going to be probably the most efficient in this day and age.

I think that, Mr. Wilson, that reflects what you were talking about in your direct evidence, about people are becoming more aware about efficiency and we see that every day with your chairman and --

THE CHAIRMAN: Well, Mr. Greenspoon, what is the question? We are very interested to hear your views, but what is the question?

MR. GREENSPOON: Oh. I apologize. I didn't mean to make a speech.

Q. The question is: Do you agree that the latest technology is the highest efficiency?

MR. WILSON: A. Yes, sure. That is generally true.

Q. I wanted to ask you what, Mr. Wilson,

I think you used to used the word, what -- who are your allies? When you talk about "allies", who are you talking about?

A. Allies are all those organizations and individuals who have a role to play in increasing the energy efficiency and electrical efficiency of Ontario.

Q. So, does that include environmental groups?

A. I believe it does.

Q. You believe it does?

A. Yes.

Q. So, how do you incorporate the views of environmental groups into your planning?

A. I would say we haven't done a good job of that to this point.

Q. That you haven't done a good job?

A. I do not believe so, no. So the views are environmental groups are part of our general situation assessment when we do planning, but I certainly have no experience of face-to-face discussions outside of, I guess, strategic planning that we did a year-and-a-half ago, where we specifically sought the views of Greenpeace, I believe it was.

Q. Do you plan on doing something to change that?

A. I expect as we go forward over the next few years, we will be doing more and more of that, yes.

MR. SHALABY: A. Maybe I will add something here. I think this may be applicable to demand management, but certainly, there are exhibits in this hearings that are 2 or 3 inches thick that show the extent of consultation with the environmental groups regarding the Demand/Supply Planning Strategy and alternative plans as we proceeded over the last three or four years.

Q. Yes. I have read those documents. I have seen those.

A. Several hundred groups made submissions in response to them is well-documented.

MS. FRASER: A. Also, at the working level, we deal with a variety of both consultants and committees and things like that. I sat on the Special Advisory Committee on the Environment, the City of Toronto, which produced a very aggressive energy-saving plan in support of the City of Toronto's CO(2) reduction targets and I found that process as useful from my own edification in terms of taking ideas back

that we could implement and work on, and there were a number of environmental groups represented or individuals with environmental perspectives on that committee, as well, so it was quite an interesting process.

Q. Okay. I wanted to ask a question about fuel switching. I think it was Dr. Connell that asked and I wasn't able last night to find the exact reference, but I think you can recall when he asked whether there were any other options for fuel switching, any other technologies other than gas, and I wondered what Hydro's position was on the fuel switching as it might be applicable, for example, to solar or wood photovoltaics.

...

[10:32 a.m.] Will Hydro, in its programming, encourage people -- for example, in the north a lot of people heat with wood. In the north more and more people now are going off the grid and installing photovoltaics. Will they be eligible to any incentives and grants for fuel switching?

MR. BURKE: A. I believe this issue did come up earlier. And the response given at the time was we were looking for guidance from the government on the extent to which they wished to go beyond natural gas as an alternative to electricity and specific end uses, but that, in principle, we would support any fuel switching that was economic. And that meant that in some cases, where alternative fuels were available, one would have to choose the most economic of the alternative fuels.

So, it doesn't mean that just because one is in an area, something like solar is available, it necessarily becomes something that we would offer incentives for fuel switching from electricity to solar, for instance, because it may not be economic relative to the choice of natural gas or oil or propane or wood in a particular application.

So, we are still looking at the total customer cost test as the basis for encouraging fuel

switching and economics of the options matters.

Q. But you are saying that Hydro's position is that any fuel switching that passes a total customer cost test will be treated equally.

A. No, I think that in the case of fuel switching it's not like in the case of demand management where we would like to do all cost-effective demand management relative to alternative supply.

Given that it is an all or nothing situation, where it is not the degree to which we do demand management, we are either displacing all of the load or we are not, we are going to displace it in the most economic way. That doesn't mean that, for instance, if you had three alternatives to electricity and all passed the total customer cost test, my sense is that we would be obliged to offer, to promote the use of the most cost-effective of the three, not all three just because they are less costly than electricity.

Q. Right. But if a customer only had one of those three options, then you would support that option, whichever of the three it was?

A. Certainly as long as it's cost-effective.

Q. So that is Hydro's position?

A. It is my understanding of it anyway.

DR. CONNELL: May I just clarify, Mr. Burke, if one of the three options was environmentally deplorable, presumably that would be set aside?

MR. BURKE: I think you are right and how all of these environmental effects filter into this issue, I think we have to look at very carefully.

MR. GREENSPOON: Q. I wasn't suggesting we put a slow poke in somebody's house for fuel switching. I mean, just following up on Dr. Connell's question, do you feel that some of these alternatives that I have named have environmental risks?

MR. WILSON: A. Well, the most obvious one is wood burning fireplaces or stoves. All of them have environmental consequences of some sort. If you look at the total lifecycle of the technology from its manufacture to its use to its disposal.

Q. I see. Do you burn wood?

A. Yes.

Q. What kind of wood do you burn?

A. Oak.

Q. And what kind of a stove do you burn it in?

A. Airtight.

Q. And do you know what the emissions

from that stove are?

A. No, I don't.

Q. You don't?

A. No.

Q. So you may be hurting the environment burning wood.

A. Quite right. A lot of consumers make choices in ignorance.

Q. But there is technology out there now that doesn't hurt the environment. And, in fact, a sustainable use of wood probably has a negative impact on the environment, a negative CO(2) impact?

A. I really can't accept the proposition that there is any technology without some environmental consequences.

Q. But we are comparing technologies. I mean, you are impugning, you are saying that, by implication you are saying that hydro electricity is somehow cleaner than wood.

MR. B. CAMPBELL: I'm sorry.

MR. WILSON: I didn't say that.

MR. B. CAMPBELL: I have not heard the witness say anything even remotely like that.

MR. GREENSPOON: All right.

Q. Are you saying that?

MR. WILSON: A. No.

Q. You're not saying that.

A. I am not suggesting for a minute. I am just saying that there are environmental consequences for some of the things that you have listed.

Q. All right.

So, Hydro's position then is not that fuel switching to wood is worse on the environment than electricity?

A. To my knowledge we have not examined that proposition.

I do recall hearing that in the Los Angeles basin wood burning has been banned because of its environmental damage. So there are circumstances where this is --

Q. There is nowhere in Ontario very much like Los Angeles.

A. Perhaps Toronto, it seems to be on some days.

Q. Well, it may not be appropriate to burn wood in Toronto, but maybe in northern Ontario it would be appropriate?

A. I certainly agree.

Q. Okay.

But you haven't taken that into account in your forecast, Mr. Burke?

MR. BURKE: A. I haven't taken what into account?

Q. That people in northern Ontario may switch to wood as a fuel switching option if they are not on the gas pipeline?

A. Well, in Exhibit 257, the one that looked at potential, we have provided estimates for the potential for reduced electricity load through switching to natural gas and we also provided a number if people switched to oil.

Effectively that is the number that you would get if everybody else in the province switched to another fuel. We have chosen oil, but if you want to know what the load impact of everybody switching off electric in those market segments is, then it is included in the potential and the issue of whether it is oil or propane or wood has not been resolved.

Whether those are economic versus electricity has yet to be resolved as well. We have simply provided for information purposes the result.

Q. But when you extrapolate or when you make the next calculation in that figure, when you go from potential to reality or to your forecast to get

the 1600 round number -- isn't that the round number for fuel switching, 1600 megawatts? And then you have to reduce it back for the natural EEI that you lose in the base forecast. I think it's in your Exhibit 260.

A. The round number for what? Attainable?

Q. Attainable?

A. Yes.

Q. So, attainable hasn't taken into account any people switching to wood?

A. No, I think we made it quite clear that Exhibits 257 and 258 are based on an assumption that only switching in areas where natural gas is available to natural gas are being considered. And that we are not aware of whether or not the government intends or has any intention to have Hydro promote the use of electricity -- sorry, of other fuels for space heating and water heating in areas where natural gas is not available. We are seeking government clarification on this issue. We don't have it yet.

Q. So the potential is academic. Whether you have included, as you say, because of your assumption that everybody would switch to oil, even if they couldn't, or if they couldn't get on to gas, it's academic because what you have said -- let me get this

straight then.

You have said that wood and solar would be included because you have said what if everybody switched to oil. You have still included that in potential but that's academic because in attainable you have only got the ones that can switch to gas.

A. Let me clarify this again.

In Exhibits 257 and 258, the whole exercise refers to the switching to natural gas, and we offered in Exhibit 257 the estimate of what the potential would be if you switched to oil. And in my direct evidence I gave the estimate of what the potential would be if you switched to oil. And then Mr. Poch asked for an undertaking on Case C, what would that flow through into attainable if we carried that through, and that undertaking either has been filed or will be filed shortly.

Then you will have the number that is consistent methodologically with everything else but taking everybody in the province who is on electric space heating or water heating off electricity to, we have said oil, it could be something else. Frankly we haven't even assessed the economics of whether a conversion to oil is economic. And that is one of the reasons why we didn't wish to pursue those estimates at

this time because it is not quite as clear in the case of oil what some of these costs may be.

So, we are looking for policy direction, we need more information. But if what you are interested in is what is the load impact, then at the attainable level that will be supplied in the undertaking. I can look up the number for if you want to know it.

Q. No, I don't care about the number. I just want to know whether it is in the 1600 megawatts and you have said it isn't and that's fine. I don't... Mr. Poch wants the number. I am sure he will deal with it adequately.

Now Mr. Burke, while I am talking with you, you are not convinced - I am paraphrasing because again I don't remember the reference - but you said you weren't convinced that - maybe to soften your quote a little bit so you will accept it - you remain to be convinced that it will be easy to achieve the 2,000 megawatts. Is that sort of your feeling?

A. First of all, the 2,000 megawatts is in a previous world which we have now updated. I mean we are now talking 3500 megawatts in the combination of standards and perhaps mandation and so on.

But if you are asking the previous

situation, the 1990 load forecast, and in preparing a primary load forecast that had in it an estimate for year 2000 EEI of 2,000 megawatts, yes, I think that is a challenging target for the company.

It is not challenging because the potential doesn't exist. We have indicated there is a lot of potential out there. It is challenging in terms of delivering it by the year 2000.

Q. So I guess to turn the question around then. Would you classify yourself as being pessimistic that you are going to meet it, or optimistic?

...

[10:45 a.m.] A. My forecast, is supposed to be my 50/50 assessment, you know, I am not trying to build into the forecasting process a bias one way or the other.

Now, I would have to say, in practical terms, one of the reasons why I think there is a good 50/50 chance that we will either exceed, or that this a good forecast, the corporation is behind it, and I would hope that the chances are less that we would fall below 2000 than that we will fall above it, but there are risks.

Q. So, the corporation is behind it. What is the corporation doing? I don't mean what is the corporation doing, that's obviously a ridiculous question.

Specifically, what is Hydro doing in its own operations? Let's take this room as an example. I understand that Ontario Hydro pays the lease on this room; is that your understanding, Ms. Fraser?

MS. FRASER: A. I am not familiar with the those sorts of...

MR. B. CAMPBELL: They wouldn't know that.

MR. GREENSPOON: Q. None of you know. Let's assume Hydro does. I think they do.

If you look at one of these fixtures, Ms. Fraser, there happens to be one right above you.

MS. FRASER: A. That's right.

Q. And it looks like, this one here anyway, it's got four tubes in it.

A. Yes. They are called 4 by 4 troughers.

Q. So not good.

A. Well, it depends on the lighting level that you need. Given that I have to read numbers pretty quickly, it's probably what we need.

However, I suggested yesterday that the lighting quality would be better if they were T8s and as well they would be more efficient.

These are energy saving fluorescent tubes; they aren't energy efficient fluorescent tubes.

Q. These are the old 32 watt kryptons?

A. These are 34s.

Q. 34 krypton filled.

So, they are energy saving but they put out less light?

A. That's right.

Q. The luminairs or the per kilowatt or per watt.

A. The lumens.

Q. The lumens per watt are the same?

A. Yes, about the same.

Q. So, it's not energy efficiency; it's less light?

A. That's right. And that is fine in a lot of applications which are overlit, particularly now as we move into the computer age where we are moving from high ambient light levels to more task lighting.

Q. I want to come back to that because I don't I think I accept that and maybe we will talk about that some more. I hope that we can discuss that later.

A. Or that we can move, I should say.

Q. Just let me finish with that point before I go.

Mr. Wilson, you are not aware that Hydro tried to do anything when they signed the lease to make this room more energy efficient in lighting?

MR. WILSON: A. No, I am not.

Q. What about at College Street, University, are all the light bulbs at Ontario Hydro Place energy efficient?

MS. FRASER: A. Right now, the 60,000 fluorescent tubes that are in University Avenue are 34 watt tubes. That plan is to retrofit to T8 lighting

either by the end of this year or early next year, in addition to a major retrofit of our HVAC system which we also expect to save a significant number of megawatts with it from the feasibility study that we have just completed.

At the College Park, the building where the energy management group is, in 1988 when we were starting the lighting program, doing the research for it, the first think we did was ask the building manager at College Park to change to 34 watt tubes so we could see what would happen. On our floor we did that, the result was that the building management was so intrigued with the results that they have now retrofitted the whole of College Park with energy saving tubes on all the floors, as well as the common retail areas, they have done a major lighting retrofit to HID lamps.

Q. Now, energy saving, when you say energy saving --

A. I mean the 34s as opposed to energy efficient T8s, which, when we started there were hardly -- we actually couldn't find an installation of T8s in 1988.

Q. Don't you agree Ontario Hydro shouldn't be installing 34 watt --

A. It depends on the application and it depends when we are doing it. This was back in 1988 when T8s weren't a part of the --

Q. But let's say today.

A. Oh, absolutely.

Q. Absolutely not.

A. We are pushing T8s.

Q. Anybody who installs a 34 watt bulb today is making a mistake?

A. It depends if, for instance, they are going to renovate their building within two years and they know they are going to change their ceilings and do something, they want to then change their fixtures, they might as well go with an interim step of energy saving.

But certainly our incentives of T8 lights are the equivalent $800 a kilowatt, our incentives for 34 watt tubes are the equivalent of, I think it is about $40 a kilowatt.

Q. But those are the exceptions. That's not what you are going to go out --

A. Oh, yes, we are pushing T8s, absolutely, with electronic ballasts.

Q. Okay. I will come back to that.

Mr. Burke, Espanola, you said, I didn't

quite understand, the Espanola project didn't seem to impress you in terms of its potential.

THE CHAIRMAN: I don't recall that evidence, but perhaps you can refer to where Mr. Burke said that the Espanola project didn't impress him.

MR. GREENSPOON: Okay, that is perhaps a wrong choice of words.

Q. My recollection of your evidence was that whatever results come out of Espanola could not necessarily be extrapolated mathematically to the provincial population?

MR. BURKE: A. I think what I said to Mr. Poch was that the savings rates, the proportion of energy saved in space heating from Espanola, yes, first of all, it could not be necessarily directly extrapolated to the province, and secondly, I think at the time we were discussing whether, by the year 2000, it would be reasonable to expect a project approach like that to be applied to the province as a whole. And, yes, I am skeptical that it would be possible to have all of the housing in Ontario retrofitted in a way like the Espanola project by the year 2000.

The potential that we have in the residential sector that we have identified for space heating improvements is essentially very similar to

what you would get if all of the houses in Ontario had all of the cost-effective demand management measures installed in them. The question is the rate at which that can happen.

And if I am skeptical about anything, it's that one can suddenly across the province retrofit all houses.

I think the savings rates associated Espanola are fine. One has to recognize that that community is in the north and therefore it has a higher rate of energy saving -- sorry, electricity use for space heating than the south, so that there differences between that community and the province as a whole. Also, the electric space heating market share is about twice as high in Espanola as it is for the province as a whole.

There are a variety of reasons why Espanola's experience shouldn't be extrapolated directly to the province as a whole. You have to do it carefully. But I believe that in doing the estimates of residential efficiency improvement potential for the province in Exhibit 76, we have, in fact, captured a good estimate using our 1,000 house survey information of what the potential for economically retrofitting every house is, and really what we have to work on is

getting the participation rate in that potential, the penetration rate up and getting it to happen faster. But the current expectation is that we will not have come anywhere close to getting that full potential by the year 2000.

Q. Now, the one phrase I didn't understand was the one relating to space heating relative to the rest of the province. Would you repeat that?

A. Well, subject to confirmation, but my understanding is that if you are referring to the comment I made about the amount of electric space heating used per house is higher in Espanola than for the province as a whole.

Q. What does that phrase mean?

A. What I mean is because it is colder up north, there tends to be more electricity used per house for space heating.

Q. But what does that mean? Does it mean that there is more electricity used to heat the houses in Espanola, or does it mean that more houses in Espanola have electric heat available?

A. Both of those are true. That is, the market share in the Town of Espanola for the electric space heating is, I believe, roughly twice the

provincial average.

Q. What does that phrase mean? Is that metered?

A. It means of the total houses --

Q. Is that a metered amount? Do you meter how much electricity is used in Espanola for heat?

A. No. What it means is that we know how many houses there are that are all electric in Espanola. There is all kinds of analysis that's done, that is being done of the sensitivity to different climate zones of the electric space heating load. Essentially, Espanola is a northern town that has space heating load considerably above, per house, above the provincial average, and it also happens to have -- a larger share of the houses in that community are using electric heat than the provincial average. So both things are the case.

Q. But you haven't metered it?

MR. MacLELLAN: A. We haven't metered the individual homes in Espanola to find out if they are using more electricity to heat their homes.

The only way they would not do that, based on the number of degree days in Espanola versus Toronto, for example, is if the insulation levels were

substantially higher than the average across the province.

Q. Or if they burned another fuel?

A. Or if they burned another fuel.

Q. You don't know how many chainsaws are in Espanola?

A. No.

Q. You don't know how many people cut wood. You know that it's a lumber town, you know that most people there work in the bush with chainsaws?

A. I don't know that.

Q. Lots of people burn wood, I put it to you, in Espanola. I will bet if you went around and counted you would be surprised.

Why doesn't Hydro do that? Why wouldn't they do that and find out how many wood stoves there are in Espanola?

A. That's actually the purpose of doing this kind of program in a town like Espanola. Our research is kind of progressing from the 1,000 home audit which covered the whole province, and now it's essentially a technical evaluation test in a town such as Espanola. And each of those homes are going to be audited. At the end of the project we should know, I doubt we will know how many chainsaws there are, but we

will know how many wood stoves there are.

Q. So, Mr. Burke, that puts some doubt on your theory; doesn't it? I put it to you that it does.

MR. BURKE: A. Not at all. I think it absolutely confirms that before we extrapolate from Espanola to the rest of the province we have to be very careful.

But it doesn't change my view that potential induced EEI estimate for the residential sector based on the 1,000 house study is a reasonable estimate of the remaining energy savings in existing households.

Q. But your biggest reason for that was because of electric heat. That was what you told us.

A. That's what we are trying to say, yes.

Q. That's your biggest reason why you don't think that Espanola can be extrapolated, the biggest reason is because there is a lot of electric heat --

A. No, no.

Q. That's what you said.

A. I made it absolutely clear that what I was concerned about was not the amount of savings per

house, but the rate at which you could extrapolate the program to the province as a whole.

The potential is quite different from the attainable. What goes into the forecast is how much we expect to attain by a certain year. The potential I don't have any problem with.

If we do the numbers right, whether they have got the wood stoves in it or not, get all that sorted out, we can come up with a number. The question is, how many houses in the province can benefit from the same degree of complete retrofit by the year 2000. That's what remains to be determined. And at this point the estimates that I have available to me suggest that it is unlikely that we are going to get anywhere near all of the houses in Ontario retrofitted to the same level that the Espanola houses are intended to be by the year 2000. I believe Mr. Poch's comment at that point was, that's the poverty of using the year 2000. Well, I agree. Sometime we will get all these houses done by maybe not by the year 2000.

Q. Is it clear, am I wrong or am I right, that you that you aren't saying that Espanola is not necessarily - if we look at it as a pilot project, given the differences - that it is not necessarily impossible to retrofit every house in this province; it

is just a matter of time.

A. Absolutely. That's what the potential numbers indicate. What I am saying is the potential numbers essentially attempt to put in to all of the houses in Ontario all of the cost-effective, weatherization, thermal upgrade measures, and that's what we are attempting to do in Espanola, I believe.

...

[11:00 a.m.] Maybe we are going to go beyond that. I am not sure, but certainly, that is what the potential estimates contain and the trick in going from potential to attainable is to figure out the pace at which this can feasibly happen.

Q. So, really, Espanola is a pilot project and there are other uses in other areas that we don't have in Espanola, for example. There is not a lot of need for air conditioning in Espanola.

That would be something different in Toronto, that perhaps Ontario Hydro would figure out how to save some energy with and that would be something that maybe a pilot project in a small town that needed air conditioning would then determine that for a city like Toronto.

A. Is there a question in there?

Q. Do you agree that that, then, is something that Ontario Hydro is going to do? I mean, I guess the problem I am having is, is Ontario Hydro going to leave it go with Espanola and is that the last pilot project?

MR. MacLELLAN: A. No. It is certainly not the last pilot project. It is one in a series that will help us develop what programs we deliver to the marketplace over the next ten or fifteen years. We

will take the results from Espanola and use them in program design.

The issue of the question of time is very valid because we have also done some studies about the infrastructure in the province and they say that if we have taken an Espanola-style project and, let's say, we made it valid province wide, if we had any more than 2 or 3 per cent uptake per year, the infrastructure of contractors and material couldn't handle it.

So, there are a lot of things that need to be done based on the results of the pilot, not only in program design, but in infrastructure development, as well.

Q. I wanted to ask you, Mr. Wilson, a question about, you sort of gave a preamble to the whole demand management program. You talked about, although you didn't use the word, I think you and I had a conversation in the hall and we talked about paradigm shifts and you agreed with me, I think we -- and in your evidence - rather than talk about our conversation, I will talk about your evidence - that you think that there needs to be a culture change, that there will be a culture change in Ontario.

I wanted to ask you whether Ontario Hydro, in terms of your knowledge of what Mr. Burke

does in forecasting, and I know you are not the forecaster, if you have taken into account the cascading effect that that might have, that once a person becomes aware of the impact they can have on the environment through conservation, what impact that would then have on the load forecast and the demand management possibilities.

MR. WILSON: A. I would have to say that is a pretty complex question. It has a number of different parts. One is what Mr. Burke thinks he has incorporated in the forecast, which I will ask him to comment on, and the second is, more specifically, the assumptions that the energy management people make when they estimate penetration rates.

The pace at which we think our programs which succeed in gaining people's attention and influencing their behaviour is substantially more successful than other electric utilities have been through the 1980s, and although times are changing and should get easier, we think they are very difficult targets.

But part of the game plan, as I said, is to make the efficient use of energy as important in people's minds as protection of the environment.

I did not link environmental awareness

and energy efficiency, although I personally believe there is a link that is important.

Now, perhaps my colleagues could comment on the degree to which they are relying on a culture shift. It is my understanding that that is an underpinning of our overall strategy.

MR. MacLELLAN: A. We are relying quite a bit on the culture shift your mentioned to increase penetration rates. An example of that is the power sleuth questionnaire audit program that we have run a few pilots of and are launching full-scale next year.

When they ran essentially the same program down in California, they got about a 12 per cent response rate from those who had it mailed to them.

Our first pilot program in North York, we had a 32 per cent response rate and that has been going up ever since, so we can see that kind of a culture shift happening as our response rates increase.

We also notice in some of the surveys we do, a heightened degree of relationship between energy and environment in Canada versus the same kind of research that has been run down in the U.S., so we want to try and take advantage of that, as well.

Q. So, we are better conservers than the

Americans; at least, according to that survey. Is that --

A. Well, we are more concerned about it. I didn't say it had yet translated into action.

Q. I see, okay. Anybody else want to comment on that? (No response) All right. Thanks, Mr. Wilson. I'm sorry. What is your name?

A. Ian.

Q. I know you are not Julia Mitchell.

A. No. Ian MacLellan.

Q. Thank you. Just moving on to that same issue, I picked up a few pamphlets at the Hydro store at the Fairview Mall before I went back up to Manitoulin and I have made them exhibits.

Mister Clerk?

THE REGISTRAR: Exhibit number is...

MR. GREENSPOON: The three exhibits; one is about a showerhead and one is about lighting and one is about appliances.

THE REGISTRAR: No. 287, Mr. Chairman.

THE CHAIRMAN: They are collectively in as 287.

---EXHIBIT NO. 287: Three Hydro pamphlets.

MR. GREENSPOON: That will be fine, Mr. Chairman.

Q. Now, Mr. Wilson, this is a good example of the --

THE CHAIRMAN: No. We are not. No, no. Hold it just a moment.

THE REGISTRAR: Which one have you given us?

THE CHAIRMAN: This is the pamphlets.

MR. GREENSPOON: Oh. I am sorry. I wasn't able to reproduce. I didn't want to take pamphlets for everybody from the store and I photocopied them.

THE CHAIRMAN: All right. Did you photocopy them?

MR. GREENSPOON: Yes, I did.

MS. PATTERSON: This doesn't look like pamphlets.

MR. MacLELLAN: May I provide a copy to the Board?

MR. GREENSPOON: No. I provided eight copies to the clerk.

MS. PATTERSON: They are here.

THE CHAIRMAN: They are here. Just hold on a minute. Do you have some extras, Mr. MacLellan?

MR. MacLELLAN: Yes.

THE CHAIRMAN: Perhaps you might put them

on the desk. Those who want to look at them may be interested.

Mr. Greenspoon, we have some more if you want. Maybe some of the people would like to see them.

MR. GREENSPOON: "How To Save Energy By Using Your Showerhead" is not one of my exhibits.

MR. B. CAMPBELL: Well, it is on the list that we were provided with that I thought you just referred to.

MR. GREENSPOON: Q. It is maybe a different picture. At the top of the one, the new one, I guess is it later, Mr. MacLellan, the one that says, "Be A Power-Saver"? Maybe you have taken away all my questions about showerheads now.

MR. MacLELLAN: A. This is a more recent edition. I do not believe the contents have changed substantially.

Q. Okay. Well then, it doesn't matter. We will refer to the old one and the new one to make sure that we are right up-to-date.

Anyway, Mr. Wilson, on that last issue, I got these pamphlets and it certainly is not the case that Ontario Hydro is pushing electricity when you read these pamphlets. Do you agree with that, that it's a change?

MR. WILSON: A. It is not a recent change, but it is a change from the '80s.

Q. It is a change from the '80s?

A. Yes.

Q. Although, there are still some utilities, municipal utilities that are pushing electric heat and in your forecast, electric heat is still assumed to grow in Ontario?

A. I do not have knowledge of specific utilities, but I understand there is a variety of marketing practices. Mr. Burke can comment on the second point.

MR. BURKE: A. I think the reasons why electric space heating shares grow in Ontario is discussed in Panel 1. You will find the reasons given there.

Q. Why doesn't Ontario Hydro put a ban on electric space heating in the future?

MR. WILSON: A. That is very simple. It is not our decision. It is not within our powers.

Q. Why doesn't Ontario Hydro put out a pamphlet that says that it is not an efficient use of electricity?

A. It is an efficient use of electricity. It is just that there are other fuels

that are more efficient or, pardon me, less costly.

Q. Do you not think that Ontario Hydro should be discouraging people from using electric heat in the future?

A. Yes.

Q. Why would you not put out a pamphlet, then, that said that?

MR. MacLELLAN: A. We have a pamphlet out that describes the various cost advantages and disadvantages of all types of heating systems. It is called "Heating Your Home" and it tells people what the economics are. It doesn't specifically discourage them from electric heat; it tries to let the numbers speak for themselves.

Q. Mr. Wilson, do you think that there is a trend at Ontario Hydro that they have accepted that there is a trend towards a more conserving society?

MR. WILSON: A. It goes beyond that. I would say that Ontario Hydro tends to provide leadership in this area.

Q. And that leadership is reflected in saying that, as you said 30 seconds ago, that in some cases two hundred and fifty thousand houses a year, I think in the forecast, Mr. Burke, will be heated

electrically, new houses?

MR. BURKE: A. What is in the forecast is what is going to happen, the basic load forecast is what is anticipated to happen in the marketplace independent of Hydro action.

The primary load forecast, after taking into account our electrical efficiency improvement programs and now fuel switching, may modify that considerably. Well, we do not have the fuel switching yet in our primary load forecast, but clearly, it will be there pretty soon.

But the reason, and this was quite clear in Panel 1, why electric space heating still has an increasing share, is that the share of oil in non-gas areas goes down significantly in the forecast period. The share of gas for the province, as a whole, stayed roughly the same; it is just that electricity, as the market has been indicating for the last five to ten years, is the fuel of choice that people in non-gas areas have chosen for their heating use.

That is simply what has happened to the electric space heating market, it is not conversions of people to electric; it is in the new market, the share has been increasing, has been higher than the previous average because of the switch away from oil.

People are essentially only installing gas and electric at this point with a very small market share for oil in the new market.

Now, maybe the economics do not suggest that that is appropriate. That is a case where the price is not what people are taking into account. They are making their decisions on other reasons, perhaps.

Q. But wouldn't it be better for Ontario Hydro to, if you could subtract that amount of load from the forecast, just eliminate all the electric heat in your forecast, it would be a lot easier for Ontario Hydro to meet the demand if that portion of the load was not there?

A. I think what you are talking about is the primary load as opposed to the basic load and you shouldn't really be concerned about the fact that in the basic load that we are projecting, that other things equal, Hydro hands-off, province, no policy change in this area, we were projecting what we were projecting. It was a reasonable forecast to make.

We are now in the situation where some policy decisions seem to be on the verge of coming forward and actions will be taken that will affect the primary load forecast.

Q. So, it is clear that your forecast

does not anticipate by the year 2000 that...

Your forecast has a certain number of houses being electrically heated from now until the year 2000. That is in the forecast?

A. The basic load forecast has that in it; that is for sure.

Q. How many megawatts is that? Do you have that figure at the top of your head?

A. I do not have it at the top of my head, but we supplied it in various places.

Q. It is significant?

A. Yes. But it doesn't mean that that is what the primarily load will ultimately be and I don't think any implication that somehow we are making the wrong forecast because policy changes are coming about is appropriate.

It is not, effectively, the assumptions behind the basic load forecast and what it is intended to represent are perhaps something that you find difficult to accept, but it is the primary load forecast that ultimately determines the requirements for supply.

...

[11:15 a.m.] Q. But there are two different issues here. There is the issue of what you think might be, based on your forecast, and there is the issue of how Hydro is going to change that. That's what I understand demand management is.

And that's why my question is: Why is Ontario Hydro not doing more? And I am not talking about fuel switching; I am talking about doing more to discourage people from installing electric heat in a new home.

MR. MacLELLAN: A. You are talking about radically restricting consumer choice. Electric heating goes into homes for a number of reasons, but primarily, firstly, because it's the cheapest installed product, very similar to the nonprofit housing issue in commercial where they have effectively banned electric heat.

Q. You mean because baseboard heaters are really cheap to buy--

A. The whole installation --

Q. --for the contractor?

A. The main issue is the duct work, not the heaters themselves, yes. So when you don't have to install duct work, it is a far cheaper system to install.

That's why electric heating tends to be a higher market share in the north: people don't have the consideration of air conditioning, so they don't bother installing duct work, naturally they end up with baseboard, so we have a higher market share in northern Ontario.

Q. Well, there are a lot of technologies that eliminate duct work with other fuels as well. I mean....

A. But none of them are as cheap as your basic baseboard system.

Q. Well, I am not going to get into a debate with you about that, but I put it to that that's not the point. That is a contractor's decision, that's a decision of the home buyer.

But, in the end, if we have to pay for Darlington, or another one like it, we are going to pay for it at that end. It is not appropriate to heat a home with electricity any more; isn't that the truth?

A. Appropriate from Hydro's point of view or from the customers'?

Q. Appropriate, from anybody's point of view?

A. That's kind of a broad generalization....

MR. WILSON: A. Well --

Q. Well, let him answer the question.

MR. MacLELLAN: A. I am not sure I can answer the question because it's a policy decision. It's a essentially a provincial government policy decision. We are not yet in a position where we want to or are able to restrict consumer choice to that extent.

Q. Well, given that the government has decided to ban it where they can, quickly and easily, and that's in the -- I forget the initials of that program - NP....

MS. FRASER: A. That's the Nonprofit Housing Program.

Q. Right.

A. And that's because the government's own regulations were responsible for the high penetration --

Q. It is a quick and easy place to do it. Doesn't that send a message that if it's economical and reasonable to do it there -- they are not doing it there because it's not an appropriate solution, they are doing it there because it's a place they can act.

And I put it to you that that is the way

that Ontario Hydro should be moving with electric heat in the province generally. And I am not saying pass regulations or change the Power Corporation Act. I am saying why don't you put out a pamphlet that says it's not an appropriate fuel to use for heating? Unless you don't believe that?

MR. BURKE: A. Maybe I can simplify this. If this was a decision which had no implications for other fuel choice in the province, maybe we could do that. We could say, don't use electricity for lighting, don't light, your decision.

But if it is a case where we are talking about implications for, well, if you don't use electricity, use something else for heating. Heating is something people need and we will have to have a certain amount of it. Other fuels are impacted. It really is an energy policy issue.

The government has tabled legislation, we have provided you with two exhibits that give you an initial estimate of the impact of that legislation, and I don't see that there is a whole lot more that we could be doing at this point. I am sure there will be pamphlets by the millions pretty soon on the question of fuel switching. But it is not an electric-only decision.

MR. MacLELLAN: A. And what you are talking about really is taking our current literature, such as our heating and home brochure, and after the costs, which give clear evidence that electricity is a more expensive home heating source, adding a sentence that says "As a result of the above data, we advise you don't do this." So, it's a matter of degree more than anything.

Q. So you might be prepared to do something like that?

A. Might be, yes.

Q. All right. Would you let me know, Mr. Burke, how you determine the proportions in your forecast of natural and induced EEI? How do you determine where an efficiency measure falls into with those?

MR. BURKE: A. Let's start with the natural. The basic load forecast either implicitly or explicitly includes a certain amount of efficiency improvement. And if we want to figure out how much that is, we have to essentially try to estimate it ex-post; that is, we do a basic load forecast, which is sensitive to price and all kinds of other factors, and we do it from an end-use perspective and an econometric, and we described all that, and after the

fact we can try to assess the natural, some sort of estimate of natural efficiency improvement, and it is relative to what some people might consider a frozen efficiency base case.

Now in practice, though, when we are looking at potential induced EEI versus total potential EEI using the terms that are in, I guess it's table 4.3, 4.7 - it is the one I referred to in my direct and had an overhead that described the various terms - in fact, the technologies themselves are assessed individually and some determination is made whether or not the economics of that particular measure are such that customers can be reasonably expected to adopt it of their own accord or whether it's something that is going to require some inducement by Hydro in order to take effect. So that it is not a situation where we are determining proportions.

Q. So you have to make a judgment at that point whether the customer is going to choose it or not?

A. Yes, we are trying to use some fairly quantitative rules. But we can't strictly do it on the basis of cost-effectiveness because there are all kinds of other barriers to acceptance and I think we have described those I think at length. So that --

Q. That's one of your toughest predictions is to decide where it goes. It sounds pretty tough to me.

A. It is not really a--

Q. It's not a prediction?

A. --prediction. No, it's really an assessment of where things are today and....

Q. And where they will go tomorrow?

A. Well, where the penetration of those natural technologies will go to tomorrow.

Q. But all you can base it on is the past?

A. No.

Q. Past trends?

A. The basic load forecast -- I don't want to go into how we have done --

Q. No, no, right.

A. --that, that's something we have spent a lot of time on.

So, the question is in looking at all of the EEI technologies and measures that we could conceivably be building into the potential induced, how do we split some of those off and say, well, this is a natural measure, we expect people to do that anyway, this is something that will need some inducement. It

is essentially based on a range of considerations but to a large extent it is if things are really cheap and the payback is very rapid and it is just a matter of time before people will adopt them of their own accord, then those become natural measures.

But the perception of what is cheap varies by market segment. And in cases where there are all kinds of other barriers, money, it may not matter what the more efficient measure costs, it may not be adopted because the individual customer has no incentive to do so.

And I guess to that extent there is judgment, but I think the understanding of what is cost-effective to a customer currently by market segment is something we are getting a better sense of and what the barriers are, and so I think that's an issue which is quite tractable.

Q. But there are some personal value judgments in the decision?

A. I don't think they are personal value judgments at all.

Q. Well, they are made by persons based on--

A. There is a distinction I think.

Q. --their common sense?

A. No, not common sense. I think what I am talking about is there is empirical data as to how the majority of people in that segment make their decisions. It is not personal.

Q. You are making a decision on what the future is going to be. You are not a witch, you are not a witch doctor. You have to base your decision on data from the past and you have to bring your own common sense into that decision and it has to be a personal value judgment. Even if you do it with a lot of people, it has to be a personal value judgment?

A. I don't think it's a personal value judgment if I observe that in an apartment building, people, the tenants have almost no incentive to conserve and so I wouldn't expect them to make any efficiency improvements to their multi-residential units. And so very low cost efficiency improvement measures require inducement.

And at the other extreme, to observe that people who are building new office buildings and seem to be installing measures that have four- and five-year paybacks all by themselves in new office buildings don't require inducements for those measures but may require inducements to go beyond that. This is not something that is a personal judgment of mine. It is

something which is in fact empirically observable and it shouldn't be a personal judgment of anybody's.

Q. Well, did Hydro do a study on the Loblaws light bulbs to see how many of the people that bought them lived in non-metered apartments?

MR. MacLELLAN: A. No, we asked how many lived in apartments. We didn't ask about meters.

Q. So, presumably most of those people lived in non-metered -- the odds are that most of them lived in non-metered apartments? There is many times more non-metered apartments in Ontario.

A. Okay. The odds are. Actually a very small fraction of purchasers lived in apartments; predominantly it was all homes.

Q. That's your personal opinion, maybe other people at Ontario Hydro, the people who live in non-metered apartments won't buy compact fluorescents?

MR. BURKE: A. You know, it's pretty important --

MR. B. CAMPBELL: Just a moment. You said that's his personal opinion. Are you talking about the data that Mr. MacLellan referred to?

MR. GREENSPOON: No, I am going back and asking Mr. Burke the question.

MR. B. CAMPBELL: I'm sorry. I am just

following from one answer to the next question and it sounded to me like it was going to be read in the transcript as if that's Mr. MacLellan's personal opinion.

THE CHAIRMAN: Just to make that clear. It is Mr. MacLellan's evidence, as I understand it, that in the light bulb program a significantly larger number of home owners bought it than people from apartment buildings. Is that right?

MR. MacLELLAN: That's correct. And that's not my personal opinion. That is the result of our follow-up research.

MR. GREENSPOON: Q. And what is the ratio, do you know?

MR. MacLELLAN: A. Offhand I don't remember. Certainly quite a bit less than 10 per cent were apartment dwellers. I can check on that.

Q. And do you know how many people in Ontario live in apartments?

MR. BURKE: A. It is about a third.

Q. About a third, all right.

And now going back to you, Mr. Burke, it is your opinion that people who live in unmetered apartments will not buy light bulbs?

A. It is not my opinion.

Q. I mean energy efficient light bulbs.

A. It is not my opinion. It is something that we have some empirical information about. It is one of the reasons, for instance, why so many people have observed and there have been studies at various places that have suggested the efficiency improvement if you meter individually as opposed to in bulk is significant.

And we discussed the potential if we were to be able to meter individually as opposed to in bulk and this is not just somebody's opinion. There are a variety of situations where this has been tested: studies in the States that suggest 30 per cent efficiency improvement or difference in efficient electricity use or energy use per household if the individual is metered individually as opposed to is bulk metered. And people can argue as to whether the 30 per cent number applies appropriately for Ontario or whether it should be lower and higher and so on, but this is not something that is somebody's opinion.

And I guess I have difficulty with the idea that you are trying to, I think, push quite seriously that there is any sense of a personal opinion involved in forecasting because there are judgments. But judgments may be things that are not hard and

quantifiable in the sense of there is a neat statistical study that proves exactly the point that is being required, but it is based on statistical evidence of large numbers of people or experiences here or elsewhere. It is not something that just because you use the word "judgment" it becomes a personal opinion.

Q. But Ontario Hydro doesn't have a pamphlet -- or in their energy efficient lighting pamphlet, it doesn't suggest to people anywhere, at least when I read it, that if you live in an apartment it's still a good idea to put in a compact fluorescent, even though in the short run you are not saving yourself any money -- you are saving the landlord money I suppose.

...

[11:30 a.m.] You don't put that in the pamphlet that the impact on the environment is less because less electricity is used. That's not in this energy lighting pamphlet. You are not encouraging non-metered apartment dwellings to use energy efficient lighting.

MR. MacLELLAN: A. We are not targeting them specifically and trying to give them a specific non-economic reason to purchase, no, but we are also not discouraging it.

Q. I put it to you that that would maybe help.

I don't understand this to be a target, this pamphlet, is it? This is at the Hydro store.

A. No, that is a broadly-used pamphlet across the province for any residential.

MR. GREENSPOON: Maybe we could break, it's 11:30.

THE CHAIRMAN: All right. We will break now for fifteen minutes.

THE REGISTRAR: This hearing will take a fifteen minutes recess.

---Recess at 11:31 a.m.

---On resuming at 11:50 a.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Please be seated.

MR. GREENSPOON: Q. Mr. Burke, I heard this morning on the news that there is an 11.8 per cent rate increase at Ontario Hydro in the next year. What impact would that have on the total customer cost test, I guess, what impact does it have on avoided cost.

MR. BURKE: A. None.

Q. Why is that?

A. Because avoided cost is a function of the long-term cost of alternative supply, and Mr. Shalaby has described it in detail. It's not a function of rates at all.

Q. Well, maybe I am simple-minded. If the rate goes up, why doesn't that make an energy efficient alternative more economical, one that maybe just didn't meet the total customer cost test?

MR. SHALABY: A. It makes it more attractive from the customer perspective.

Q. Yes. But why doesn't it change the avoided cost?

A. The avoided costs is our expected cost to make the electricity. If the costs to make the electricity have gone up, then the avoided cost will go up.

Q. Well, presumably if the rate --

A. And if the rates have gone up because

the cost of making electricity have gone up, then there is a link in there.

Q. Would it not be a fair assumption that the reason the rate announcement was made and that the rates have gone up is because the cost to make the electricity has gone up?

A. Well, it's more to do with the facilities that are coming into service right now rather than the facilities that we project to come into service in the next century.

Q. So that would be Darlington then.

A. I think the rate announcement mentioned Darlington, yes.

Q. So, the rate announcement is because Darlington cost more than you thought?

MR. B. CAMPBELL: Just a moment.

Mr. Chairman, the rate announcement has not been made yet. It us scheduled, I believe, to be made at 2:00 this afternoon. It is a matter which I intended to speak to, assuming that it is made, at 2:30, so that the Board has the information but it is not made yet.

Given that it is imminent, I would take objection to Mr. Shalaby being cross-examined on newspaper paper reports when by 2:30 we will have the

content of the announcement.

THE CHAIRMAN: Can we proceed on the basis that assuming that there is a rate increase of about that dimension, what would be the consequences.

By the way, this is ground we have gone over considerably before, but I won't interrupt if we don't get into it in too much more detail.

MR. SHALABY: My court?

MR. GREENSPOON: Yes.

MR. SHALABY: I am saying that if there is a link between the rate increase, the reason for the rate increase and the future cost of supplying electricity, then avoided costs would correspondingly be adjusted.

MR. GREENSPOON: Q. Mr. Burke, is this something that you anticipated having, assuming that there is an 11.8 per cent increase in the rate today?

MR. BURKE: A. Well, the short-term load forecast that was prepared earlier this summer assumed 11.5, as a matter of fact.

The forecast prepared last January, I think, was a little bit lower than that, but I would have to look up exactly what our price assumption is.

Is that an important number?

It wouldn't have been more than 2 per

cent less than what we have actually gotten for this year.

Q. All right. I wonder if we could turn to Exhibit No. 117. Now, I know that -- what this is a chart. This is a chart that I believe I introduced in Panel 1, that shows a projection by Ontario Hydro of about 60,000 megawatts of power by the year 1990. This projection was made in 1978, I believe.

It's clear, you would agree, Mr. Wilson, that you were at Ontario Hydro, first let me ask, in 1978?

MR. WILSON: A. Yes.

Q. And that projection was clearly inaccurate. We don't need 60,000 megawatts. We aren't using 60 megawatts of power today?

A. No.

Q. We are using about 25,000?

A. About that.

Q. And it would be fair to say that a forecasting of 60,000 megawatts as opposed to what has turned out 12 years later to be 25,000 megawatts is a forecasting breakdown, would you agree with that characterization?

THE CHAIRMAN: I am just not quite sure how this fits into what we are talking about in Panel

4, which is the demand management program. This was all gone through in quite a bit of detail in Panel 1, the forecasting methodology, the reliability of it, and uncertainty and all the other factors that go into forecasting.

Perhaps if you could direct the questions to demand management aspects, I would appreciate that.

MR. GREENSPOON: All right.

Q. Given that we have gone over all of that material and it is so inaccurate, the forecast was so inaccurate, why is it not fair to assume that your demand management forecasts are just as likely to be inaccurate?

THE CHAIRMAN: Well, that really is just doing the thing another way.

The accuracy of the forecast is a matter that we went into in Panel 1. We are now dealing with specifics of the demand management program.

Aspects of the demand management program, or the technique of developing the forecast for that program, or the techniques of designing that program, those are proper questions for this panel, but general questions about accuracy of forecasts I don't think help this Panel at this particular time.

MR. GREENSPOON: I understand that I

neglected to make the first interrogatory an exhibit, Mr. Chairman, and that was Interrogatory No. 1.6.53. Perhaps the clerk could give that the next number.

THE REGISTRAR: That would be 261.36, Mr. Chairman.

MR. GREENSPOON: Thank you.

---EXHIBIT NO. 261.36: Interrogatory No. 1.6.53.

MR. GREENSPOON: Q. Is Ontario Hydro aware that B.C. Hydro and Burlington Vermont Electric pay customers to fuel switch?

MS. FRASER: A. I am aware that B.C. Hydro has a program. I'm not aware of Burlington Vermont's.

Q. I think it is still up in the air whether Ontario Hydro, given the questioning that we went through earlier before the break, it's not clear to me whether Ontario Hydro really wants to discourage electric heat, but for the purposes of this question, assume that there is merit in discouraging electric heat, and if Hydro really believes in fuel switching and that they should discourage electricity where an alternative fuel like gas is available, why not pay the customer to switch to gas?

MR. B. CAMPBELL: Mr. Chairman, with respect, hasn't this matter been dealt with?

I think from the very beginning of their direct testimony, Ontario Hydro has made it clear that now that it has the statutory authority to provide incentives, or it expects to get it this fall if the legislation passes, that it intends to develop programs that address this matter. Those programs, as I understand it, the incentive feature will be considered in the design of the programs now that the statutory authority is becoming available, but that the program designs have not simply progressed to that stage because of the need to sort out some of the policy considerations and because of the simple fact that this matter is not yet concluded.

Now, I think that this ground has been gone over if not at least four times, maybe more already in the course this panel's evidence.

THE CHAIRMAN: That may be, and I wouldn't disagree with that necessarily, but I think Mr. Greenspoon can proceed with this particular area if he wants to explore it further.

I think you have summarized my understanding of what the evidence has been to date.

MR. GREENSPOON: I think the question was more specific, Mr. Chairman. I understand what my friend is saying.

Q. I am just asking, Ms. Fraser said that she is aware that B.C. Hydro actually pays a dollar figure to customers to switch.

MS. FRASER: A. We expect we will be doing so too once the legislation passes.

The guaranteed energy performance program already includes an element of that now as long as it's an energy efficiency option.

Q. All right. Exhibit 25, which is the demand management in the 1989 supply plan, table 2.2.41, which is found on page 19, now I take it that the three last columns on that table, that is EEI lifecycle costs, system avoided cost, and the total customer cost saving, when you look at those three figures in any one sector, that difference, the last number, that difference on the last number is why, Mr. Shalaby, each of those, if those were particular programs, would meet the total customer cost test?

MR. SHALABY: A. Yes.

Q. Now, there is quite a difference in some of those numbers. Let's look at the residential sector where we have a lifecycle cost of 2.3 and an avoided cost of 4.8. The total customer cost saving is 2.5.

Does Hydro believe that there are no

significant efficient resources in that gap of 2.5 cents that would then meet the total customer cost test?

MR. BURKE: A. I think you will find the answer to your question elsewhere in Exhibit 25 but also in Exhibit 76 there is a clearly a load reduction curve that indicates that there is a range of costs in the sector, and I think we have been quite clear already in direct that each measure is assessed by the total customer cost test. So, the most expensive measures in the segment meet the customer cost test, but on average they wouldn't, given the fact that they would have results that yield net savings relative to avoided cost because there are some that are lower cost.

...

[12:05 p.m.] Just looking at the slope of all those load reduction curves, it is pretty clear that that is the case.

Q. So, the answer still remains that all economic efficiency technologies have been included in the forecast?

A. Well, we are talking about the estimate of potential induced here.

Q. Right.

A. Yes.

DR. CONNELL: Mr. Burke, just to clarify, the figure of 2.5 is, therefore, the average for all the measures that meet the test and that the total of 1,920 megawatts is, in fact, the sum of all those?

MR. BURKE: Yes. In Exhibit 25, yes.

MR. GREENSPOON: Q. I wanted to ask you about discount rates, just leaving that exhibit.

Does Hydro use the same discount rate for buying efficiency or in evaluating efficiency as it does in its supply planning when it builds a new nuclear plant?

MR. SHALABY: A. We went into that in Panel 3 and the answer was "yes."

Q. The answer is "yes"?

A. Yes.

Q. I had two areas that admittedly may be more related to supply panels, but given that the evidence as it was brought out, or I am sorry, with the system panels, but given the way the evidence came out about peak, about clipping and load shifting, I am wondering if these are perhaps appropriate in this panel. Now, if they were dealt with in another panel, you can let me know, but that is... Two different issues: One is the issue of power plant auxiliaries and that is the efficiency of the power plant, itself.

My understanding, from my experts is that there is about an 8 per cent loss at the power plant itself of the gross generation that the plant puts out with the auxiliaries at the plant. I am looking at you, Mr. Fraser (sic), because I thought maybe this was something or maybe it is Mr. Shalaby.

A. Since there is no Mr. Fraser, maybe Mr. Shalaby will respond.

Q. I am sorry.

A. That is fine.

Q. Mr. Shalaby.

A. The 8 per cent; some plants are in that range, some are lower than that in terms of what we call station service. Hydraulic, for example, the station service is much less.

Q. So, 8 per cent is a figure of some plants?

A. It is a reasonable estimate for the fossil and nuclear stations.

Q. My understanding is that cost-effectively, that can be reduced by 40 to 50 per cent?

A. That, I don't know.

Q. You have no knowledge of that?

A. No.

Q. The other issue is load management pools. I think, Mr. Burke, that is something that maybe you know about or maybe, Ms. Fraser, that is your area, where different utilities pool load management incentives and thereby save on the electricity that they use? Are you aware of that experience? I think it's being used in California.

MS. FRASER: A. I am not exactly sure that my understanding of it is the same of yours or maybe we are talking about something very different.

I am familiar with situations where utilities have saved power in one jurisdiction and then sold the surplus as a result to other jurisdictions. Is that what you are talking about?

Q. No. Actually, it is a load

management pool between users.

A. No. I have heard about it in terms of customers, but not among utilities.

Q. In terms of customers?

A. Yes. I have heard about it in terms of customers.

Q. Well, maybe I will leave that then. If we could turn to Interrogatory 1.6.49.

THE CHAIRMAN: Perhaps we should give it a number.

THE REGISTRAR: 261.37, Mr. Chairman.

---EXHIBIT NO.261.37: Interrogatory No. 1.6.49.

MR. GREENSPOON: Q. Now, Ms. Fraser, I gather that this would be your area. This is an interrogatory dealing with lighting.

MS. FRASER: A. Well, we all look at lighting differently, but the scenarios given were done in my group, yes.

Q. All right. Now, Scenario No. 1 goes from four lamps to three lamps?

A. It goes from, yes, 40 watt lamps down to 32 T8s.

Q. Why would it not go to two lamps with better reflectors? Is that not the state-of-the-art in the technology right now?

A. This does include reflectors. I guess it depended in this situation what lighting level was required. Our program expects that the IES, the Illuminating Engineering Society lighting standards will be maintained. So, I am not sure exactly, you know, they may be doing fine work in the office as opposed to working on computers. I am not sure. They are obviously intent on retaining a similar light level and they needed three lights plus a reflector to do so.

Q. Well, is it not your understanding that you can do that now with two lamps with the state-of-the-art reflectors, as opposed to three?

A. I think that depends entirely on the lighting design. It also depends upon the surfaces that the light is shining on, if it is dark wood as opposed to light wood; all sort of things.

Lighting isn't a simple matter of lumens per watt; lighting designs are actually an art form.

Q. But you have not retrofitted this fixture in that scenario. You are taking one bulb out?

A. No. This is basically a fixture change. You go from a 4 by 4 trougher to a fixture, a T8 fixture with three lamps as opposed to four.

Q. Okay. If you turn just for a minute to Exhibit 195.

A. The one I just got at break, yes.

Q. Oh. Have you not had a chance to look at it?

A. I have looked at it very quickly.

Q. Well, maybe we could just go briefly to it and then I won't deal with it until after lunch, but that would be... Unfortunately the pages do not appear to be numbered. If you would go into the document until you see a picture of some lights that we are talking about now.

A. Are you referring to the Powermaster 90?

Q. Yes. And if you just flip that page over, you will see a picture of an office building in Illinois. At the top, there is a picture of an office building.

A. Yes?

Q. And at the bottom is a picture of a man, maybe the maintenance man who took out all the bulbs, sitting there with all the bulbs they do not use any more.

A. Yes. All the lamps, yes.

Q. The caption at the top says, "A reflector retrofit of this Illinois office building... removed half the lamps...while providing essentially

unchanged illuminance."

Now, if you flip back to the other side of the page to see what they have done, this is, as you call it, a four-trougher. I guess that is what you are calling these things?

A. That is right, 4 by 4.

Q. The 4 by 4 that we have here in this room, and if you look to the left of the hand with the watch, you will see and also between the two hands, you will see what I gather is a new socket?

A. Your copy must be better than my copy.

Q. All right. Essentially what they have done, as I understand it - you can correct me if I am wrong - is they have installed an imaging specular-silver reflector?

A. Yes.

Q. And they have used what are called, I guess the brand name is Retroffer connectors to relocate the lampholders. Essentially, they move the lamps into the middle of each reflector; is that right?

A. Yes.

Q. And this image that you see, then, on the top of the page is what amount of light it gives out?

A. Well, I can't see much light coming out of that fixture. There is no doubt about it, reflectors can add a lot and that is part of our program.

Q. All right. But this is the state-of-the-art of a retrofit? You have eliminated half the bulbs?

A. Actually, I think you could probably do better than that with more efficient designs, but again, it depends on the design.

Q. All right.

A. I think to relocate the lampholders is one way of doing it. Some might call that jury-rigging and might end up leaving things not exactly aesthetically pleasing, which could ultimately end up in people putting it back the way it was; however, there are lots of different opportunities. there is no one perfect way to retrofit a lighting application.

Q. Now, in Scenario No. 1, the other thing that seems to me that is missing, and I ask you why is, you have got an electronic ballast. Why is it that you do not put in a dimming ballast?

A. Dimming ballasts are not commercially available yet.

Q. I see. Commercially available in Canada?

A. When Mr. Lovins made a presentation to us earlier this year, we asked him when he expected them to be commercially available, widely commercially available. He expected it would be about a year-and-a-half from that point; hopefully sooner. We have certainly seen electronic ballasts come along a lot faster as a result of our program.

Q. Now, in Scenario No. 2, you have kept the four lamps and you haven't put in a reflector?

A. These scenarios were not meant to demonstrate the state-of-the-art.

Q. Right, okay.

A. That is not what the question asked. It just wanted to show how you could put different applications together and how we went about adding up the savings; at least, that was my understanding of the question or interrogatory.

Q. If we could move to Exhibit 197, page xvi, I am sorry, actually the overpage, xvii.

Mr. Burke, the innovations that are described there on the bullet with the six bullets, I am interested to know, perhaps we could deal with them just briefly. The first one dealing with dishwasher

drive power and the heating energy; is that something that is taken into account in what we see in Exhibit 25 in your forecast?

MR. B. CAMPBELL: Just a minute, just a minute. I take it in asking that question that way, that my friend is not suggesting that Exhibit 25 represents Ontario Hydro's current forecast. In fact the testimony is quite clear that it has been updated significantly.

THE CHAIRMAN: By Exhibit 76?

MR. B. CAMPBELL: That is correct.

THE CHAIRMAN: Do you want to change your change your question, the combined effect of 25 and 76?

...

[12:18 p.m.] MR. GREENSPOON: Sure. I was only referring to the table that we were talking about before. As it may have been updated, I suppose, in 76, that's fine.

Q. I think the essence of what I want to know is: Is this a technology that you have taken into account as being economic in the forecast - let's just use the word forecast - in your latest forecast?

MR. BURKE: A. The drivepower load in dishwashers is roughly 20 per cent of the energy use of a dishwasher; the rest is the energy involved in the hot water itself. And I believe, even so, we have some assumptions concerning higher efficiency motors used in dishwashers. But it would save a few percent of the 20 per cent. And I do believe we probably have the essence of this sort of saving here captured, but even if we didn't it would be a very small number.

Q. Let's move on to the third one then, the 50 to 60 per cent saving and the 80 per cent saving that they talk about in dishwashers -- or in clothes washers.

A. Clothes washer designs, okay. We are working with a 40 per cent improvement in clothes washer energy use, which is less than the amounts given here.

Q. All right.

A. The horizontal axis models are certainly very interesting in that they seem to be an example where there is quite cost-effective energy savings to be gained if for some reason only 5 per cent of North American clothes washers are horizontal axis.

It is quite possible that if we were to be able to swing the market in the sense one could attain the levels here, the estimates that I think we have are based on the conventional clothes washer design, which is a vertical axis, so it is possible that there could be some motor savings and some hot water savings largely in clothes washer designs with the horizontal axis. There is no doubt about that. It is not, again, not a very large contributor to the potential induced number. If you just give me a minute here.

I think if we were to double the savings on clothes washers, we would increase things by about 45 megawatts.

Q. About two-thirds of the way down, "In commercial refrigeration...." - do you see that paragraph? - "...chiefly in supermarkets about half...." --

A. I see the paragraph, yes.

Q. "In commercial refrigeration, chiefly in supermarkets about half of input energy can be saved through a combination of improvements to display cases and their mechanical systems."

Is that in your forecast?

A. I think I am going to have to check with staff on that one. I can give you a sense of the savings that we have in supermarkets and I believe those are actually indicated in Exhibit 76 but whether the source of the savings is specifically this measure, that I would have to check.

Q. Do you want to leave that then entirely for now?

A. Let me just --

Q. Okay, take a minute.

MS. FRASER: A. I would point out we are developing a refrigeration program in commercial.

MR. BURKE: A. No, it is not explicit so I will have to check with staff to see the extent to which refrigeration improvements are included in our numbers.

THE CHAIRMAN: Do you want to pursue -- are you satisfied with the answers you have got or do you want a formal undertaking?

MR. GREENSPOON: No, that's fine. I am satisfied with the answer I have.

Q. Let's just look at the general statement on page 16, Mr. Burke. Do those figures at the bottom of the page, in terms of appliances, do those reflect the numbers in your forecast in terms of....

MR. BURKE: A. As I read the last paragraph, it refers to the proportion of the savings potential that is for each of the -- well, I think it is very difficult for me to compare because -- and I am not even sure the relevance of the comparison. I mean it just says where the savings may be, not necessarily how large they are.

THE CHAIRMAN: Those figures appear to add up to 100 per cent.

MR. GREENSPOON: Q. I just wondered if the proportions were similar in your forecast.

MR. BURKE: A. I think Exhibit 76 contains all the numbers you would need to be able to figure that out.

Q. All right.

Looking at the top of page 17, talking about residential refrigerators and freezers, the paper says that there is a potential of 87 per cent to be

saved at an estimated cost of 2.8 cents a kilowatthour.

A. Well, I really don't know the source of that estimate. The only model that is in Competitek itself comes -- well, I don't think there is a model that saves 81 per cent of the U.S. Federal Standard in the Competitek details, so I am a bit surprised by that number.

The Sunfrost refrigerator consumes about 250 kilowatthours versus about 900 in the 1990 standard for the U.S., so it's not an 81 per cent saving. And its life cycle cost is currently about 25 cents a kilowatthour as far as I can figure from the information provided in the Competitek document.

Mr. Lovins himself calculates there that that refrigerator, if it were to come down to a $1000 from its current $2500 dollar price, would have a life cycle cost of 6 cents a kilowatthour. So I have to admit this particular number here is rather surprising to me.

But we have used the number which is consistent with Lawrence Berkeley Labs' estimate of the maximum technical potential for refrigerator improvements. I think I quoted a study done for the Department of Energy by LBL and in it refrigerators which consumed 490 kilowatthours per year are

considered to be the maximum technically feasible energy use reduction.

Q. What was that number, sorry?

A. 490 kilowatthours per year in a standard U.S. model. This was a study done in 1988 by Lawrence Berkeley Labs, but....

Q. Now, when we are talking about refrigerators, if you turn to the pamphlet on appliances and on page 4 it talks about refrigerators. I am wondering -- it does indicate that, about two-thirds of the way down on the first column on page 4 on the left-hand side:

> "Units with side-by-side doors generally use the most energy, while one-door manual-defrost models use the least. However, these rules of thumb can be misleading. For instance, some of the best two-door frost-free units use no more energy than a manual-defrost refrigerator."

You indicated, I think both in Panel 1 and Panel 4, and other witnesses, that the trend is towards bigger refrigerators. I think actually Dr. Buja-Bijunas said that. And that that is in your forecast, in your estimates, that we will continue with

that trend. Is that right?

A. Yes.

Q. This pamphlet then, the one that appears at the stores, at the EnerMark stores where people go to learn about efficiency, at least one of the methods, there doesn't seem to be any mention, for example, of an automatic-defrost refrigerator.

A. Sorry, I don't see the point of your question.

Q. Do you know what an automatic-defrost refrigerator is?

MR. MacLELLAN: A. Yes.

Q. And it is certainly more energy efficient I understand than a frost-free. As I understand it, a frost-free refrigerator has a heater in it?

A. Yes.

Q. And an automatic-defrost refrigerator just goes off.

A. I believe so, as I understand it.

Q. Well, I can tell you that you can look in the Sears catalogue and you can buy one and it uses about 70 kilowatthours a month. That's the EnerGuide, an automatic-defrost refrigerator. And that's about a 19 cubic foot refrigerator. And I think

the evidence before us is that we are now -- the state of the consuming art is around 140 kilowatthours a month for the kind of frost-free refrigerator that consumers are demanding today.

A. I'm sorry, the state of what?

Q. The consuming art. That the fridge the consumer is going out to buy is around 140 kilowatthours a month.

A. No, the average of current sales is more like 95 kilowatthours a month.

Q. All right. But we are buying bigger and bigger you are saying?

A. That is the trend, yes.

Q. All right. So the 70 kilowatt -- what is the average size of that 95 kilowatthour a month?

A. About 17 cubic feet.

Q. All right. So, you don't disagree with me that a 19 cubic foot automatic-defrost is around 70 kilowatthours a month?

A. I don't disagree.

Q. Right. You understand the difference between an automatic-defrost and frost-free.

A. I understand it, yes.

Q. The frost-free has a heater in it?

A. Right.

Q. The automatic-defrost just shuts off?

A. Yes.

Q. Why is it that in your pamphlets you are not telling people that this is another option that they could be buying?

A. It is quite possibly an oversight. This pamphlet is, I believe, a year and a half old -- no, apparently a year since printing.

Q. Well, we bought ours at Sears about three years ago.

Why don't you tell people that the butter softener in their fridge is also a heater?

A. I think we do.

Q. Where do you do that?

A. It may not be in this brochure, but we certainly do in other materials.

...

12:35 p.m.] MR. WILSON: A. I think the main point on here on appliances in this brochure starts off by directing people's attention to look for the EnerGuide label and shows them how to calculate what their operating costs are and gives them the information they made to make a decision between the models that are offered to them in the showroom that will best meet their needs.

I think it would be a very thick brochure if there was a discussion of all of the features that all of the manufacturers had managed to work into all of the refrigerators, I think it would be unmanageable.

The key point here is to direct people's attention to energy efficiency in the first place and the cost justification that would appeal to them and show them how to use that information.

Q. But you are telling people to buy, basically when I read this, I put it to you, you are telling people to buy a frost-free refrigerator, a refrigerator with a heater in it.

MR. B. CAMPBELL: Perhaps my friend could direct the witnesses to something specific in the pamphlet that he relies on in reaching his conclusion.

MR. GREENSPOON: Q. The paragraph that I just read.

"Units with side-by-side doors generally use the most energy while one-door manual-defrost models use the least. However, these rules of thumb can be misleading. For instance, some of the best two-door frost-free units no more energy than a manual-defrost refrigerator."

THE CHAIRMAN: I understood it was because there was no reference anywhere in the pamphlet that is the basis for the question.

MR. GREENSPOON: Q. Well, leaving that aside for the purposes of my question, there is nothing in this pamphlet that tells people that a frost-free refrigerator has a heater in the freezer, is there?

MR. MacLELLAN: A. No, but it does say it uses more electricity than a manual-defrost.

I don't know that consumers are as interested in appliances to want to know exactly why it takes more electricity. The actual workings of it, it would take an awful lot more room.

The intent here was not it say buy a frost-free. It was a recognition, first of all, that frost-free is the vast majority of sales, and the direction by saying that the best two-door frost-free

units can take less than a manual-defrost, the idea was pay attention to the EnerGuide label, and when you are looking at sizes, when you are looking at features, make sure that you take energy efficiency into consideration.

Q. And there is no mention of the state-of-the-art Sunfrost refrigerator?

A. No, there isn't, for two reasons. First of all, it can't be purchased anywhere, so including that in a brochure would be --

Q. Come on, it can be purchased.

A. You can buy it directly from the manufacturer, I understand.

Q. Well then, why did you say it can't be purchased anywhere?

A. The purpose of the brochure was to help people who go into stores and are buying refrigerators.

We could have included virtually every time of type of appliance possible; unfortunately, the brochure would have been the size of Competitek. So, we were attempting to, as we frequently do in residential, hit the majority of consumers.

The Sunfrost refrigerators currently cost $2,500 and yes they can be purchased from the

manufacturer. But right now we would not advocate that that's cost-effective.

Q. If we could turn to Exhibit 196, that's the drivepower, page 17, Executive Summary. I guess this is your area, Ms. Fraser.

MS. FRASER: A. Yes, I can speak to it, hopefully.

Q. Is this about the same - I think we covered this in Panel 1, but just to be clear - electric motors use about half of all electricity; is that the same in Canada?

A. That's generally my understanding, yes.

Q. And this is where we found that next sentence that we talked about earlier that you agreed with, that they use about 10 to 20 times annually their cost of the motor?

A. In that ball park, yes.

Q. Do you agree with the statement that's in bold? I don't know in it's in bold on your photocopy. In the third paragraph, that 44 per cent, plus or minus 16 per cent of all electricity used in drive systems at an average of half a cent plus or minus 14.14 cents per kilowatthour can be saved?

A. I haven't studied the specifics of

this estimate enough to know were whether I could agree with it or not.

I do know there are savings to be had, not just the motor but from the rest of the driven system, and that's why we have got a performance optimization program.

Q. And, Mr. Burke, is this 44 per cent something that would appear in your calculations?

A. Our numbers are not nearly that big. I'm not sure that just because it appears here it necessarily means it's relevant for us.

Q. Well, Mr. Lovins will be giving evidence at this hearing, so I mean, I don't think --

A. Then you will have a chance to cross-examine him.

Q. Certainly. I think your point is well taken and your answer is clear.

Just for an example of what you talked about, Ms. Fraser, about drivepower, if we could move to Exhibit 97, on page 71, the diagram of three motors.

A. First of all, do you mean Exhibit 93?

Q. Yes. I'm sorry. Apparently I got that wrong. Apparently it's Exhibit 93.

It's an article from Scientific American.

Mr. Chairman, apparently I gave the wrong

information to Ms. Morrison and I can deal with this after lunch. There is no need to do it now, Ms. Morrison. I don't want to inconvenience anybody.

The next issue I wanted to deal with was exhibit number -- I'm sorry, this is one that doesn't have a number yet. This is the Employment Effects of Electricity Conservation, the Case of British Columbia.

THE REGISTRAR: That will be 288.

---EXHIBIT NO. 288: "Employment Effects of Electricity Conservation, the Case of British Columbia."

MR. GREENSPOON: The clerk has copies.

Q. Mr. Burke, on page 9331 of the transcript, Volume 51.

MR. B. CAMPBELL: I'm sorry, can you repeat that?

MR. GREENSPOON: Volume 51, page 9331, line 15.

THE CHAIRMAN: Go ahead.

MR. GREENSPOON: Thank you.

Q. Mr. Burke, do you have that?

MR. BURKE: A. Yes, I do.

Q. Now, maybe I will just read.

"I would just like to make a comment on the going above total customer cost from the job's perspective. It would be

my view that to pay for demand management than supply would not increase jobs in Ontario, and that, in fact, part of the benefit, the economic benefit, the job benefit of demand management arises because it is a lower cost way of meeting energy services than supply, and that you rapidly run the risk of going in the other direction by exceeding the total customer cost test."

I am wondering if you have had a chance to look at the Exhibit 288 before today?

A. I had a little chance to look at it, yes, but I wouldn't claim to be an expert on all of the calculations as it was done by someone else.

Q. Essentially, as I understand it, the study looks at demand management ramifications, demand management impacts on the economy as opposed to a specific hydraulic site in British Columbia known as Site C. Is that your understanding?

A. Yes, it is.

Q. And on page 39 of that article, paragraph 3, Results, 3.1, gross employment effects of Power Smart, I gather that Power Smart is their nickname for their demand management program, is it,

Ms. Fraser?

A. Yes.

Q. Mr. Burke, thank you.

Now, if you read through that paragraph, just starting about halfway through it:

> A standard indicator of the multiplier effect is the ratio of total employment to direct employment. For Power Smart it equals two. One would expect a higher ratio in a province such as Ontario where additional manufacturing, employment and income would result from investments in electricity conservation.

Do you agree with that, Mr. Burke, or is that contrary to your beliefs as to what the impacts of demand management would be in Ontario?

A. First of all, I think you have to understand what this number is. It's simply a ratio between the total employment directly attributable to the conservation technology in this case, compared to the direct employment, and I think that the inference they are drawing is reasonable, but I think what it depends on is roughly half the cost of most conservation programs is the installation and that is almost always a sort of local employment, and it really

depends on the nature of the conservation program. If the equipment that's being installed is manufactured locally, then the indirect employment can be higher. If you import the piece of technology that you are installing, then you won't have that much indirect employment.

So, depending on the nature of the programs and what is actually produced, directionally this is correct.

I think the result they get for their province and the sort of analysis is certainly subject to lots of different ways of doing things, it's really close to what we get. I am not sure that we get a result much more than two, but I have no problem with their inference here.

Q. So clearly then, you do believe that demand management is a better -- or has a higher ratio of impact on the economy in a positive way than traditional mega project supply?

A. Let's put it this way: Nothing that we have discussed so far on this topic addresses the issue you are now asking me. If you would like to get to that question, we can look at the whole article. But this ratio here simply tells you what the relationship of total employment is to direct

employment.

If you read the article it describes several layers of analysis that one goes through in estimating the employment effects.

Q. Yes, but it says that it's a standard indicator.

A. It's a standard indicator of direct effects, the ratio, the total effects and the direct effects of the conservation measure.

The article then goes on to look at the respending effects which have to do with the increase in income or decrease in income associated with the measure. That's, in fact, what I am talking about in the quote that you have turned me to in the transcript.

It then says that in order to know whether this is better than a supply option you have to subtract two sets of numbers, the one for the conservation measure and the other for the supply measure. Both of them have to be done correctly and then the difference gives you some idea of what the net job impact is.

This is a preliminary result, it's interesting, but it's not relevant to the issue you are asking me at all.

I do this work, at least I did a few

years ago, if you read this article carefully, this is just a number on the way. It's an interim result.

Q. But you can't disagree, let's turn to page 43. The first full paragraph on the right-hand column under the conclusion:

> Compared to an electricity mega project, conservation-induced employment is also more evenly spread geographically. The resource to be tapped is located in homes, shops and factories throughout the province, instead of in one valley in its northeast corner. It is possible to vary the conservation effort as an instrument of regional development. This potential is currently being explored in the U.S. specific northwest where some districts with high employment have launched particularly aggressive conservation programs.

A. That's fair enough.

I think the point is, though, I still like what I said on the transcript, and it is, in fact, reinforced by what is in this article. I am not sure that this article is completely correct in what it's

doing, by the way.

But this particular point is fine, but it really is only true if the conservation measures are economic. As I said, to be promoting uneconomic measures might have the effect, I suppose, of creating jobs locally around the province but it would also lose them all over the province through the diseconomies that this sort of program would engender.

Q. So, with of the caveat of the total customer cost test --

A. Which is the point in the transcript.

Q. Which is the point. And I wasn't reading the transcript to say that this article contradicts what you said.

...

[12:50 p.m.] I wanted to clarify that that in fact is what you were saying. It is subject to, again, the total customer cost test. But this is not a benefit. This is a benefit to the Province of Ontario, assuming that - and you do not seem to disagree - that what it says here is true, subject to -- that it is economic?

A. Yes. I think what it says is that these two different kinds of projects have different natures and as a result, some employment effects are distributed differently. But I should indicate that just the point that you brought out about the ratio between the total employment effects and the direct employment effects and, in fact, we didn't get to the subsequent stage which is the employment effects, including spending, it is only the direct effects that are distributed throughout the province. All of the indirect, reduced and respending effects, well, those are distributed throughout the province whether or not it is a supply project or a demand project; that is, things that have to do with how people spend their money or where manufacturing takes place or, you know, the source of the products that are used in any particular effort; those things, once you get past the direct effects, those are no longer site-specific, so that the larger the multiplier in fact you have, the

less the importance of the direct effects.

Therefore, this particular paragraph really is only referring to the direct effects of the supply side saying they are site-specific, but all the other effects on the supply side are quite diverse.

Q. But producing --

A. It was, by the way, the problem of the study that the Site C analysis that this was based on only looked at the construction jobs. It didn't look properly at all of the jobs associated with Site C. It didn't look it at where the generators were made and the jobs associated with making the steel that went into the generators and all that stuff.

Q. One of your caveats was that it certainly would be a more direct effect if what we bought for conservation was produced in the province.

A. For sure.

Q. So, if we were to locate - and maybe we will deal with this in direct evidence some time - but if we were to locate our refrigerator factory in northern Ontario near the North Channel, instead of putting a reactor there, it is not unreasonable to say that the employment effects for the north would be greater, assuming that they both can save the same amount of electricity as the other produces?

A. In Ontario? In principle, that is fine.

Q. And the same thing with an energy-efficient light bulb?

A. It doesn't matter what it is, as long as it is cost-effective. If it has an extremely high Ontario content and it is cost-effective versus supply.

Q. But Ontario Hydro's position is that nuclear is cheaper?

A. I think we have been spending a lot of time talking about the fact that there are lots of demand management measures that are cost-effective relative to alternative supply.

Q. Right, okay. All right. I will just leave that.

I wanted to cover one more thing and that is the cost of light bulbs. In your analysis - I don't know if this would be your area, Ms. Fraser or Mr. Burke - when you figure the load impact of energy-efficient light bulbs and do the total customer cost test, what is the cost that you use for these compact fluorescent light bulbs?

A. One moment.

MR. WILSON: A. Just to be clear, we could talk about the cost estimates that were used for

screening compact fluorescents for inclusion in an estimate of total potential or induced potential or we could talk about the light, the estimates that are more specifically used right now for the programs that are being offered. Which would you like to hear about?

Q. Well, it doesn't matter. You could give me them both. I am just wondering what the ballpark is. Are we talking the $20 or $18.95 shelf price right now?

A. I think the information from the programs would be more useful to you.

MR. MacLELLAN: A. If it is the information from the program you want, the price we are using is $20 as an average price for the variety of different kinds and sizes of compact fluorescents.

Q. Is that the price that Mr. Burke uses in his forecast?

MR. BURKE: A. I am going to have to check on that. What I, of course, look at is the incremental cost over a standard light bulb and what I have got it in here is rather unusual units. I mean, it is sort of dollars per megawatt or something, so I am going to have to check whether the underlying number is equivalent to the sort of range that --

Q. The $20?

A. Yes.

MR. GREENSPOON: All right. Well, maybe this would be a good point to break, Mr. Chairman, and we could begin at that point after lunch.

THE CHAIRMAN: We will break until 2:30.

THE REGISTRAR: This hearing will recess until 2:30.

---Luncheon recess at 1:00 p.m.

---On resuming at 2:30 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Be seated, please.

THE CHAIRMAN: Mr. Campbell?

MR. B. CAMPBELL: Mr. Chairman, just for the purposes of the record, transcript Undertaking 967.3 has now been filed into the usual way. I am also in a position to advise the Board that I have the information sheet that has been issued by Hydro today with respect to 1992 rates. Copies have been provided to Board Staff and there is a pile on the table behind where I sit that simply outlines the rate increase. I do not propose to make that material an exhibit, but it is information that people may be interested in.

As was pointed out in The Star this morning, the rate increase is 11.8 per cent and it means that the monthly residential electricity bill

will increase by about $7 starting January 1st.

MR. GREENSPOON: Q. Mr. Burke, you were going to get us the price of the compact fluorescent used in your forecast.

MR. BURKE: A. In the estimate of potential induced EEI, the value we used is about $15 for the premium cost of a compact fluorescent over an incandescent, which I think works out to a number which is slightly lower than the one Mr. MacLellan was talking about for the Loblaws market, but may reflect some anticipation that costs will fall a little bit for that technology.

Q. Are you aware that the wholesale price of compact fluorescents is about $6 to $8 U.S., in the United States?

MR. MacLELLAN: A. I wouldn't call that an average. There are some that wholesale for $6 to $8, but I wouldn't describe that as an average as far as my knowledge is.

Q. Well, perhaps we will call evidence on that, but I put it to you that that is the price that my experts tell me in the United States that these bulbs are wholesale.

Clearly, Mr. Burke, the price you are giving is more, rather than quibbling about 50 cents or

a dollar or two, the difference between $6 to $8 U.S., even converting it to $7 to $10 sounds like a wholesale price as opposed to $15, which sounds more like a retail price?

MR. BURKE: A. Yes. I think we are using retail prices.

Q. Does this --

MR. GREENSPOON: This is going off automatically. I guess I have to keep talking. That is unfortunate for you.

Q. Now, I understand that Hydro has a pilot program in Guelph to lease -- you are grabbing your mike, Mr. MacLellan, so you know what I am talking about. I understand that they have a pilot program in Guelph that leases compact fluorescent bulbs and that the purpose of this program is twofold. It overcomes the capital cost of that bulb for the consumer and it also in the long run, if it works, will bring down the price of the bulb itself because the more bulbs that are leased, presumably, the cheaper the bulb will be to manufacture,

MR. MacLELLAN: A. I agree with --

Q. Oh.

A. I have the same problem, I guess.

I agree with the first strategy, to see

what consumer reaction will be if the capital cost is eliminated, to see what kind of pick-up there will be.

The second one, to reduce the overall price of the product; we are attempting to do that not only through a leasing type program, but also through a retail availability program. The idea that the more that are sold overall, the lower the price will be.

Q. Right. And getting back to the North Channel example of the energy-efficient refrigerator manufacturer that Mr. Burke, let's say that we decided to manufacture an equivalent to the Sunfrost refrigerator, presumably the $2,600 figure that you raise as the value of the Sunfrost, if Ontario Hydro went out and did the same thing as they are doing in Guelph with the compact fluorescents and leased a half-a-million, assuming we wait until we can manufacture them, a half-a-million energy-efficient refrigerators, the cost would be substantially less?

MR. BURKE: A. I think what I said this morning also included Mr. Lovins' estimate of what that cost would be if the Sunfrost were mass produced and it would bring the cost down to $1,000 and his calculation at that point was still uneconomic. 6 cents a kilowatthour for the premium efficiency gain, incremental efficiency gain against incremental cost

and... But nonetheless, yes--

Q. Yes.

A. --you would certainly expect the cost to come down. I just want to maintain that fact that I do not believe that the Sunfrost is cost-effective, would past our total customer cost test, even at $1,000.

Q. But that is because of the avoided cost or that is because you are not using the 6 cents a kilowatt cost. I guess we will get into that in Panel 9, to find out what the real cost of nuclear power is.

A. Against the avoided costs that we use.

Q. All right. Mr. MacLellan, I just wanted to go back to this issue about Espanola. You said that basically Ontario Hydro, as I understand your answer, that Ontario Hydro is looking to the province for leadership on this issue or for the consumer.

You do not feel it is Ontario Hydro's role with respect to electric heat to ban it in the future and I gather that that was Mr. Wilson's comment, as well.

MR. MacLELLAN: A. Yes. I do not understand the relevance to Espanola, linking those two things, but related to banning electric heat, yes. I

said we were looking to the province for guidance on that.

Q. Are you aware of what British Columbia Hydro is doing, taking a leadership role where they are charging to customers that want to install electric heat, they are charging a hook-up fee of $1,150?

A. Yes. I am aware of that.

Q. And that gets the message to the builder, instead of just to the waiting on the government and waiting on the consumer?

A. Yes. Apparently, it does.

Q. And why is it that Ontario Hydro isn't doing that?

A. It is one of the things we have not considered to date. In the residential market, it relates a little bit more to the issue of consumer choice. We try to present the costs fairly to a customer and they choose what type of a heating system they prefer.

Q. Either Mr. -- well any of you, are you aware of... We talked about earlier what they called a Power Smart program in British Columbia - that is the name they have given their demand management program - that it appears that they are meeting and

exceeding all of their projected targets in demand management. Are you aware of that, Ms. Fraser?

MS. FRASER: A. Yes. And we did it last year, as well.

DR. CONNELL: May I return to Mr. MacLellan?

MR. GREENSPOON: Certainly.

DR. CONNELL: With respect to the hook-up fee, is that in B.C. related directly to costs in some manner?

MR. MacLELLAN: I am actually not that familiar with how they derived the $1,100.

MR. HARPER: Maybe I could help. I was curious about it when I first heard it and I phoned one the of the people in B.C. Hydro. My understanding is, it is some estimation of the difference in the incremental costs of installing electric heating versus natural gas heating. That is the basis for coming up with the hook-up fee.

DR. CONNELL: So, it is more like taxation than passing on the costs, then.

MR. HARPER: Yes. I wouldn't say it is cost-based from the electrical system perspective.

MR. GREENSPOON: Q. Is it not related, as I understand it is related to B.C.'s understanding

that hydraulic costs are going to be up and that it reflects the cheaper method of delivery, that it is cheaper, it is more economical to charge people a hook-up fee to discourage them from using electric heat these it is to produce that hydraulic electricity? Mr. Shalaby, you were...? No.

...

[2:43 p.m.] MR. SHALABY: A. I am trying to keep the mike alive.

MR. HARPER: A. As I said, as I explained earlier, that's my understanding of how that particular hook-up fee was derived. I think the other situation B.C. Hydro is in is that they are looking at avoided costs right now that are in excess of their average costs, which I think is somewhat consistent with what you were saying in your question. And that, in part, is what is driving their particular programs.

Q. So why doesn't that apply in Ontario? Why wouldn't a hook-up fee be a good idea in Ontario?

MS. FRASER: A. We are looking at a hook-up free relative to new commercial construction. One of the complicating factors in Ontario is the existence of municipal utilities as opposed to B.C. Hydro's instance where they are retailer as well the wholesaler.

Q. If we could turn to the Plan, table 610 -- I'm sorry, page 610, Figure 6.9. My reading of that table is that Hydro believes that the cost of nuclear power is going to go down in the future.

MR. SHALABY: A. No, that is not what that says.

Q. What does it say?

A. That is entitled "Levelized Unit Energy Cost of a Nuclear Station in 1989 dollars" and it shows two quantities. One is the levelized unit energy cost which is a green line and it is level at about 3.8 or 3.9 cents per kilowatthour.

The other line is called accounting unit energy cost and it shows that the accounting cost of nuclear power is higher at the early stages of the life of the station than at the latter stages. We explained that in detail in Panel 3.

Q. I am just looking at the Chairman's, Chairman Eliesen says - it is actually not signed by him, but the rate increase that we got today - and he says that one of the reasons that the rate increase is happening is because the plants were designated to operate at an average 80 per cent capacity but last year operated only at 63 per cent capacity. Is this chart based on an 80 per cent capacity?

A. Roughly, yes.

Q. My friend Mr. Poch just suggested I give this an exhibit number and that's probably a good idea.

THE CHAIRMAN: I think that's right. It should now become the next exhibit.

THE REGISTRAR: 289.

---EXHIBIT NO. 289: Document entitled "Hydro sets 1992 rate".

MR. GREENSPOON: Q. Now, Mr. Harper, I wanted to ask you some questions about your evidence about rate structures. Again I want to refer to British Columbia and what they have done. Are you familiar with some of the initiatives that they have proposed for their new rate application.

MR. HARPER: A. Somewhat familiar with them, yes.

Q. Somewhat. As understand it, my limited knowledge of the rate structures, we in Ontario have a similar rate structure to British Columbia at the present time and that is a declining block rate structure.

A. You would be talking about residential customers?

Q. Residential and what you call general commercial?

A. I think it is not quite the same. We have, as you characterized it, a declining block rate structure where there is a higher cents per kilowatthour charge for the first in our case 250 kilowatthours a month used and then a lower charge after that.

B.C. Hydro actually has a service charge which is you pay so much per month regardless of how much you use as well as a declining block rate structure.

Q. But other than that it is a similar declining block structure.

A. Well, the two rates structures are as I defined.

Q. Right, okay.

My understanding is that British Columbia Hydro expects residential rates in the long run to move towards an inverted block structure and that is almost exactly the opposite of a declining rate structure, declining block structure. So that the last block, that is, the most expensive block of power that you would get on your bill would be apparently and approximately equal to the cost of new supply.

A. Yes. That's my understanding. They have a multi-phase or multi-year plan. I can't remember whether it is something in the order of seven, eight years I believe, and the idea is over those seven or eight years, they are proposing, and this is what they are going before, basically, the public service commission right now to review and have public discussions on, is the idea of basically increasing or

taking most of the increases, annual increases in their rates in that end rate and moving it up to the point where I think four or five steps down the line, it is equal to the first block and then after that it goes in advance. I think they have also qualified that in the sense that obviously each of those steps would be subject to --

Q. They will monitor it.

A. Monitor it and each of those steps will be subject to public review in subsequent rate hearings, yes.

Q. And when I read about British Columbia Hydro, it doesn't sound a lot different. And Mr. Wilson maybe I can give you a quote and I think that you would agree that it sounds like Ontario Hydro's position.

This is from British Columbia Hydro:

> We are in the conservation business and we also intend to price our products so that it accurately reflects the scarcity value of the resources that go into producing electricity.

Certainly, you would agree, that that is Ontario Hydro's position? Would you or would you not?

MR. B. CAMPBELL: Perhaps my friend could

explain what B.C. Hydro means by the scarcity value and the other terms that are used in that. I don't think that's a fair question without some explanation of what B.C. Hydro is dealing with in those matters.

I don't want this then taken and used in some completely different way, inappropriately. I don't know what those terms mean and there is nothing on the record that gives anyone any indication of what those terms mean.

MR. GREENSPOON: Q. Let's remove the word "scarcity" because I am not speaking for British Columbia Hydro.

MR. WILSON: A. Would you mind repeating that for me, please.

Q. We are in the conservation business and we also intend to price our product so that it accurately reflects the value of the resources that go into producing electricity.

A. That's our general position as well.

Q. That's your general position.

And with regard to the inverted block rate structure, they feel that it will contribute to their overall thrust of encouraging energy conservation. And my question is: Why would that not

apply in Ontario? Why would an inverted block rate structure not contribute to the overall thrust of Ontario Hydro's conservation program?

MR. HARPER: A. If I could maybe answer that. It goes back to something I said a few minutes ago and that is B.C. Hydro is currently in the position where their estimates of their avoided costs are higher than their average costs and as a result if you were -- which is in contrast to where we are here in the sense of where our avoided costs are to some extent less than our average costs.

Q. Is that because you are saying that hydraulic power is rising at a rate faster than the cost of nuclear power?

A. I am not really familiar enough with the B.C. Hydro's avoided cost calculations to understand why they are in that particular situation. I just know --

Q. But they are mostly a hydraulic producer, a supplier from hydraulic power.

A. Yes, that's correct.

Q. And we are substantially a nuclear producer and will be in the future.

A. I think part of what is going on here is to try and decide what will be in the future in

terms of type of supply.

Q. If we could just go back to lighting. The exhibit called the "State-of-the-Art lighting", it is Exhibit 194, just a couple of brief...

Ms. Fraser, maybe you could comment about the reasonableness of the statement on the third paragraph, starting with the italics:

> If fully and systematically used wherever practical in existing U.S. buildings, these techniques put together provide light at least as bright, effective, attractive and reliable as now. Often more so, but using at least 92 per cent less electricity.

Do you think that is a reasonable statement?

MS. FRASER: A. I am not familiar enough with the U.S. lighting situation to comment on that.

Q. Do you think that if we did everything that we could do to our lighting in Ontario that we could save 92 per cent of the electricity that we currently use for lighting?

A. I think lighting gives us some great opportunities for incredible savings. I haven't done the kind of analysis that would be required to estimate

this.

Q. Mr. Burke?

MR. BURKE: A. I think I indicated in my direct evidence the results we were getting, which was that in some office building applications our estimates are more like 50, 55 per cent savings on average across the sector, whereas for commercial lighting as a whole 33 per cent, given that not all citings were equally applicable.

I think what Mr. Lovins states is that if the best case that he is sort of talking about is applied everywhere, you can get a certain percentage saving, but in practice it is not possible to apply it everywhere, it is not appropriate to apply it everywhere.

But I think that we do have a difference of view as to even in individual applications how much is economic today, and maybe some of -- his estimate is including technologies which we are not considering as cost-effective today and on the market commercially available today. That may explain some of the difference.

DR. CONNELL: May I ask a supplementary question?

MR. GREENSPOON: Certainly.

DR. CONNELL: Are savings on a variety of lighting programs offset to some extent by higher cost of winter heating?

MR. BURKE: To the extent that electric space heating is used in the commercial sector, there is cost in terms of extra electric space heating in winter and there is a saving in terms of reduced air conditioning load, and I think that for the sector as a whole there is a net saving associated with air conditioning savings because electric space heating is not a large share of the market and it doesn't -- particularly in the multi-residential component in the areas where we are getting most of the efficiency gains in offices and so on, it is a much smaller share. So that the air conditioning benefit dominates the space heating savings.

DR. CONNELL: But you wouldn't count in higher costs and other fuels then if applicable.

MR. BURKE: That's an interesting subtle point that in practice in the EEI numbers that we have used for the analysis, there has been implicitly an increase in natural gas requirements for heating in commercial buildings and we have not -- that's not factored into the analysis.

So that in a subtle way there was a

little bit of fuel switching going on in our EEI programs before; that is, to the extent that we were saving heating, we were in fact shifting people to using more natural gas for heating when they used more efficient lighting in the wintertime.

DR. CONNELL: Just overall because of mean annual temperature considerations, the balance in the total customer cost test as likely to be more favourable to the efficient lighting systems in the U.S. than in Canada?

MR. BURKE: I think that's safe. In fact, all I know is that the amount that we assign to air-conditioning system reductions is in the area of 10 to 20 per cent depending on the building type, whereas it is not uncommon to see a 30 per cent or more for U.S. studies, and Mr. Lovins in some of his analyses seems to imply even much larger proportions of air conditioning savings than that, but our numbers are only in the 10 to 20 per cent of the lighting load savings.

MR. GREENSPOON: Q. I wanted to turn to Volume 47 of the transcript, starting at page 8377. I think that's you, Mr. Wilson. On line 3 you say that:

"The 1989 Demand Management Plan, which is Exhibit 25, represented our best

estimate of what could be accomplished through demand management...."

And then if you just go directly across to the other page, line 4 -- I'm sorry line 6, you say:

"Last November the government of Ontario asked us to double our efforts, and $240 million was diverted from preengineering of supply options to demand management programs."

Now, my question is: Does that mean that Ontario Hydro's estimate was 50 per cent low or does that mean that the present government by telling you to double your efforts is unrealistic?

MR. WILSON: A. Neither.

Q. What is your explanation?

A. I don't understand what there is to explain.

Q. I think you have answered the question, that's fine.

To follow up then, was it like a light bulb - maybe that's a bad metaphor - but was it a light bulb going on or why didn't Ontario Hydro think about taking that $240 million from supply and putting it in demand management before they got the government directive? ...

[3:00 p.m.] I guess that is the same question. Is it a bad investment or is it a failed opportunity?

A. I think I explained in this part of the discussion, two things were happening at once; one was that the government wanted us to move more quickly with demand management programs and the second thing is that opportunities presented themselves to us to spend a significant fraction of that on cost-effective measures.

Q. All right. Moving to line 16 on page 8378, I guess I am not clear on what section of the Power Corporation Act banned fuel switching. My reading of the Power Corporation Act is that there is no ban on fuel switching and although it may have been Hydro's feeling that they did not have the power to do it, I am looking for a section of the Act.

THE CHAIRMAN: This is a really illegal question. The understanding of the members of this panel was that under the existing legislation, they could not engage in encouraging fuel switching. That was their understanding of the statute. Whether that is a correct interpretation or not, I guess is an illegal question.

MR. GREENSPOON: Well, maybe we could get an undertaking from Ontario Hydro to provide us with a

legal opinion as to why they couldn't fuel switch under the Power Corporation Act.

THE CHAIRMAN: I think as a matter of it being a question of law, that it is a matter that whether their opinion or not, it is something that anyone here, including yourself, could reach their own opinion on.

MR. GREENSPOON: Well, but with all respect, Mr. Chairman --

THE CHAIRMAN: But, if Mr. Campbell has the relevant sections available, perhaps he will shorten it by supplying them. Have you got them, Mr. Campbell?

MR. B. CAMPBELL: Well, there are two principals involved in this, Mr. Chairman. First of all, of course, the corporation is only authorized to do -- it has no natural powers. It is is only authorized to do what the Act permits, but Section 56(b)(3) of the existing legislation speaks directly to this matter, in that it sets out a prohibition that:

> The corporation shall not loan money or provide incentives or assistance under this section to assist in the conversion of a space heating system to a system other than one based in whole or in part

on the use of electrical energy.

That was in the section that deals generally with the topic of loans for energy conservation and clearly, in our submission, it supports the position that we have taken on this matter and apparently the government felt so, too, because that is the specific section that is being amended in the legislation specifically introduced by the government. If you look at the Bill that has been introduced to overcome what was seen by the government in the understanding of its own legislation as an impediment to fuel switching programs.

MR. GREENSPOON: As you said, Mr. Chairman, maybe we will argue that at another time.

THE CHAIRMAN: All right.

MR. GREENSPOON: Q. I wanted to refer to line 19 of that same page. Mr. Wilson, I think these are still your words:

Another important change is a provision that will allow us... I am down on line 19.

MR. WILSON: A. Yes. I have it.

Q. It will:

"Allow us to help Ontario industry develop energy efficient products and services. This will allow us to work

directly with industry to push back the frontiers of energy efficiency in Ontario."

My understanding of particularly the 1989 amendments to the Power Corporation Act were that you always had the mandate since then to push back the frontiers of energy efficiency in Ontario and, in fact, those amendments to the Power Corporation Act obligated you to do that.

MR. B. CAMPBELL: Again, Mr. Chairman, I don't think it is appropriate to put questions that require statutory interpretation to these witnesses. It is not for these witnesses to make submissions on what Ontario Hydro is either (a) authorized or (b) obligated to do by the legislation. That is a matter of law for argument and in my submission is an inappropriate question to the panel.

THE CHAIRMAN: Perhaps it would be a proper question, though, to ask them if it was their understanding of their statutory mandate that they couldn't do what they said they now could do in lines 19 and following. Is that...?

MR. GREENSPOON: Q. Mr. Wilson?

MR. WILSON: A. Well, it is my understanding that we were encouraged and it is one of

the best strategies we have, to work with manufacturers to persuade them to introduce or upgrade the product and the efficiency of the products that they offer in Ontario and to provide the training to their dealers to really build the market for efficient products.

My understanding of the current proposed amendments is that we will be enabled to go beyond that and to invest directly the increased capability in Ontario for the production of efficient goods.

Q. On the next page, page 8379, Ms. Fraser, you have a document that on line 8, Mr. Wilson said:

> "Then in late June, the Minister of Energy proposed a wide range of aggressive energy efficient initiatives in a consultation workshop."

You told us, I think in direct, that you were at that workshop.

MS. FRASER: A. No, I wasn't.

Q. Oh. You weren't?

A. No.

Q. But you have the paper?

A. Yes.

Q. All right. And I understand that that paper, do you have it with you?

THE CHAIRMAN: The paper, I believe, is Exhibit 249; is that correct?

---Off the record discussion.

MR. GREENSPOON: My friend and I do not think it is on the record.

THE CHAIRMAN: Well, there is an Exhibit 249, which is entitled "Potential for Energy Conservation and Carbon Dioxide Reduction." Perhaps that is not the same.

MR. GREENSPOON: No. These are specific programs, as I understand. I have seen the paper, but I didn't make it an exhibit. I don't know if it is in the public domain or whether it is the property of the Ministry or Hydro.

MS. FRASER: My understanding is that it was released at the London workshop for consultation.

MR. GREENSPOON: Q. At the workshop. Well, I just have a general question about it and that is that you would categorize some of the initiatives as aggressive initiatives in there?

MS. FRASER: A. Yes.

Q. I understand that for each initiative or for most of the initiative, target dates were set. Perhaps you could read some of those out, just one or two.

A. Yes. For example, adding energy provisions for commercial/industrial buildings such as ASHRAE 90.1, they had put the date 1993 after it.

Q. All right. And a number of those initiatives have dates and as you have said, they are aggressive initiatives that have been set out by the Ministry of Energy.

MR. B. CAMPBELL: I am sorry, Mr. Chairman. Just a minute, just a minute.

Mr. Chairman, I think my friend is misdescribing this material.

As I understand it, this material was distributed for the purpose of obtaining views. It does not represent a commitment by the Ministry of Energy or the government to take these specific initiatives on the specific dates. It was here are some things we are thinking about and we would like to get some feedback on these matters.

It may well turn into programs and so on on those dates, but in my submission, on my limited understanding of the material - and if I am wrong, I would be delighted if my friend would correct me - but that it does not represent an initiative to which either the Ministry of Energy or the government is committed by the certain date. I think I have

described it fairly.

MR. GREENSPOON: Well, let's get that on the record then.

Q. Is that Hydro's position? Mr. Burke, you as forecaster, that these dates are not firm dates and that you have not taken any of these initiatives into your forecast?

MR. B. CAMPBELL: I am sorry, Mr. Chairman. That has nothing to do with my objection to this. I just want to be clear what it is we are talking about, and what I am asking for the Board to indicate is that I believe the way my friend has described it misdescribes it and I think before the discussion proceeds any further, it should be clear either he agrees with the way I have characterized that material or I would like him to indicate what he is relying on in saying that these are initiatives to which the government is committed. That was not my understanding.

THE CHAIRMAN: First of all, what are we talking about? Is this a document of some sort?

MR. GREENSPOON: Perhaps the best thing to do, Mr. Chairman, would be if I could borrow the copy from Ms. Fraser and make copies of it for everybody to have after the break and then we could

talk about it.

THE CHAIRMAN: First of all, what is it we are talking about?

MR. GREENSPOON: It is a consultation workshop with the Minister of Energy as to, as my friend categorizes it, some discussion areas on energy efficiency possibilities for the future in Ontario.

THE CHAIRMAN: And it is your understanding -- you do not have a copy of it, I take it?

MR. GREENSPOON: I do not now. No, sir.

THE CHAIRMAN: It is your understanding it was a hand-out at this workshop; is that what you are saying?

MR. GREENSPOON: Yes, sir.

THE CHAIRMAN: Then you would agree that it doesn't represent, or does it, or do you agree that it is not a statement of policy, but just an agenda for a workshop?

MR. GREENSPOON: Well, I guess it is a question of weight, how you categorize... I mean, we talked about some of the evidence in this panel on direct dealt with how far is the government going and how the policy is unclear.

I guess this is one document that you, as

the Board, will have to weigh as to how much direction it shows the government will be going in and how that is reflected in Hydro's forecast.

THE CHAIRMAN: My understanding is that any significant alteration in government policy with respect to the matters that pertain to this hearing will be filed by the government at that time. I understand Ms. Couban has done that from time to time.

MR. GREENSPOON: Well, that is fine, Mr. Chairman. I will move on.

THE CHAIRMAN: I am not suggesting you have to move on. You can ask about the workshop and what went on there if you want to. I mean, I am not not cutting you off. I just think we have to understand what we are talking about.

MR. GREENSPOON: I think I will leave it until after the break when I can have my copy.

THE CHAIRMAN: Fine.

MR. GREENSPOON: Q. I wanted to talk, Mr. Harper, about on the next page, 8380, line 18:

> "This change, when added to our load shifting and peak clipping efforts means that demand management should reduce electricity demand by the year 2000 by 5200 megawatts."

MR. HARPER: A. I am sorry. Where are you?

Q. Line 18, page 8380:

"This change, when added to our load shifting and peak clipping efforts means that demand management should reduce electricity demand by the year 2000..."

You haven't got it?

A. Yes, I have got it. I do not believe this was myself. I am trying to determine who it was.

Q. Oh, okay. Well, maybe you would be the best one to answer it, even if maybe it was Mr. Wilson.

MR. B. CAMPBELL: What is the question?

MR. GREENSPOON: Q. The question is: Would it not be fair to say that load shifting and peak clipping are really not conservation and shouldn't be considered as a demand management investment?

MR. HARPER: A. I am sorry. What do you mean by "conservation"?

Q. Well, it is load management. It is not efficiency. It is not going out and saving electricity by putting in some hardware and using less electricity?

A. I guess this gets back to how we

define efficiency. I would look at load shifting as being a more efficient use of the system overall and the same if you can encourage people to participate in peak clipping programs where you don't have to provide firm capacity for them, that also being a more efficient use of the system. So, I think it's back to maybe how you are defining efficiency, itself. I would agree it is not EEI in terms of electrical efficiency improvements, as we have been talking about in that context, but it is more efficient use of the system.

Q. Now, I just wanted to get back, I guess again, to you, Mr. Harper, on page 8393, line 4, and I want you to relate your answer there: "Hydro's aim is to reduce the cost of electric service by slowing the growth in demand for electricity."

Now, I want to relate that to the chart that we talked about on page 610 of the Plan?

A. Again, I do not believe this was myself, but maybe we can get to the question and we will see who can best answer it.

Q. All right. Is that not a contradiction that "Hydro wants to reduce the cost of electric service by slowing the growth in demand"? Does that not contradict the position that I take from the chart on page 610 of the Plan? That seems to me to

indicate that in 1989 dollars, the cost of nuclear is going to go down. That seems to be Hydro's position.

MR. SHALABY: A. I just commented on that figure, Figure 6-9 on page 610, that it doesn't mean at all what you say. It shows a difference between the accounting costs and the levelized costs, that is all it says, of a particular option.

Q. Is it not Hydro's position that the cost of nuclear power over the 40 years that they project the reactor to be alive for is going to go down?

A. The accounting cost, the way we account for the cost--

Q. Yes?

A. --is higher in the early years, then it declines, then it goes up again at the time of retubing and then declines again. That is the pattern that the accountant wants to collect his money.

Q. All right. Mr. Harper, I think I found one where you did actually say it.

MR. HARPER: A. Okay.

Q. I am on page 8396. Maybe we should have had you answer all those questions.

A. Yes?

Q. On line 18.

A. Yes?

Q. I'm sorry. Line 19?

A. Yes.

Q. "First by setting rates that reflect costs, customers are informed of the system implications of their consumption decisions."

I guess my question with respect to that statement is, how is a customer informed of the system implications given that Darlington "A" was not included in the rate base until it begins delivering power, which I gather is not now? So, how is a customer told what the cost of Darlington is in his rate structure?

A. I think the fundamental premise in how we set our rates and actually charge our customers is that we do not include facilities in the rates until they are actually put into service and are used and useful to our customers and are providing electricity for them; therefore, we do not include Darlington in our rates and in our revenue requirement until such time as the units are in service and are actually providing service to our customers.

I think when I was talking here, I think you were talking about their consumption decisions and implications in terms if they want to use electricity in the peak versus the off-peak and charge them

time-of-use rates if they want reliable power, if they are willing to contract for interruptible power.

Q. Or a better way to tell them what Darlington is really going to cost is to charge them a hook-up fee?

A. I guess it is a matter of what you think about what Darlington is really going to cost us and how that relates to our rates.

Q. Well, maybe we won't know that until it starts producing electricity.

On page -- go ahead, Mr. Shalaby.

MR. SHALABY: A. No. That is fine.

MR. GREENSPOON: Mr. Campbell is keeping records of gratuitous answers.

Q. Page 8405. I guess I should know who said this. Mr. Shalaby.

...

[3:18 p.m.] Mr. Shalaby, on line 10, you said 1 kilowatt saving at the home translates typically to something like 1.3 or 1.35 kilowatts at the generating system because of the transmission losses and the reliability requirements.

Why doesn't Hydro pay 1.3 times whatever the dollar value per kilowatt is to go off electric?

MR. SHALABY: A. The avoided cost is calculated exactly that way: 1.3 times the capacity cost.

Q. It is?

A. It is.

Q. Now just going back to that 8 per cent - we talked about this earlier this morning - we have an 8 per cent loss right at the station if it is a thermal, like a nuclear or a fossil station? Approximately?

A. Approximately. Some stations have less than that; some are in that vicinity.

Q. So that is a substantial amount of electricity.

A. It is.

Q. But that's not what you are talking about here?

A. No.

Q. Okay.

A. The reason for that is that we talk about what we call net capacity costs, the costs of producing electricity out onto the grid.

Q. So that's right to the meter or to the house?

A. No, at the gates of the station. Whatever is consumed within the station is not part of the calculation. So the accounting is consistent.

Q. On page 8410, I think that's still you, Mr. Shalaby, you are talking about the cost of delivering the program, the municipal distribution costs, administration, maintenance. And I gather what you are saying there is that you have to -- in delivering the programs, you have to take all of those costs into account when evaluating it?

A. Again it is unlikely that I gave that kind of evidence, but I think the answer is yes.

Q. I guess maybe I should have filled in my form commenting to the reporters and said they should put the name of the witness on every page.

I go back to page 8398 and I see Shalaby --

A. I have a request for the reporters as well and that is when we reach page 10,000 we should

have like a moment of celebration. (laughter)

Q. Well, anyway, whoever said it, it describes how you evaluate demand management, a program.

My question is: When you evaluate your supply options, do you do it on the same basis? Do you include municipal administration costs, maintenance by the municipal utilities, and their administration?

A. In calculating the costs of distribution, yes, we do.

Q. In your supply options?

A. Well, the supply option, the distributing utility does not incur costs to build generating stations. They incur costs to distribute the electricity. So in the distribution costs, that's where the municipal costs are added.

Q. On page 8434, Mr. Shalaby, at line 14, you are talking about fuel switching. Line 14:

> And the benefit by moving off electricity is $14,150.

A. Line 14 of what page again?

Q. 8434.

That's over twenty years?

A. Yes.

Q. Now why wouldn't it be economic for

Hydro to pay the full cost of a new super-efficient gas furnace and to take the baseboard heaters out of the house?

A. I think as the program people were saying, this is very new to us, that initiative, and the exact program details are being formulated. So I think questions as to exactly what Hydro will do and what exactly will they pay to do what are still in the formulation stage. Whether in fact we go that far or go some distance to that is still in the formulation stage.

Q. I think your earlier -- there was some mention about advocating, promoting electric heat and I was at a different page in my notes, but I just see now that apparently the two public utilities in the province, Scarborough and Cornwall, are still promoting electric heat.

And I think, Mr. Wilson, I think you commented on that, that there were some utilities. Are you aware of that? And why would Hydro -- or could Hydro not do something to discourage the public utilities that are encouraging electric heat to not do that?

MR. WILSON: A. I think we have already answered the question on two counts. One is we are

doing our darndest to convince the municipal utilities of the merits of co-operating with us in delivery of demand management programs, and that includes stopping the promotion of basically load building marketing programs.

And the second part of our answer is that we have no regulatory authority, as we understand it, to compel them to do so.

MS. FRASER: A. Just as a point of clarification, we don't serve Cornwall.

Q. Okay. So how does Cornwall get its electricity?

MR. HARPER: A. My understanding is it buys it from Quebec Hydro.

MR. GREENSPOON: I see.

This might be an opportunity for me to try and consolidate what I have left to see if I can finish today.

THE CHAIRMAN: We will adjourn for fifteen minutes.

MR. GREENSPOON: Thank you.

THE REGISTRAR: This hearing will take a fifteen-minutes recess.

---Recess at 3:25 p.m.

---On resuming at 3:48 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session.

THE CHAIRMAN: Mr. Campbell.

MR. B. CAMPBELL: Mr. Chairman, there are two matters I would like to deal with just briefly. I may have to leave somewhat early today and will not be present tomorrow. You will have the joy of Mrs. Formusa's presence in lieu of me, but I would ask to be excused if I have to leave slightly early.

Secondly, at the pre-scoping meeting with respect to Panel 5, and in some of the correspondence leading up to that, in particular with Mr. Shepherd, I indicated that the threads of the current matters affecting non-utility generation were being drawn together in a general way for Mr. Eliesen's speech at the IPPSO conference, which is being held this week, and that that would be a good indication of Hydro's current view of consolidated state of non-utility generation matters.

Not very many people came to the pre-scoping conference, so I would like to take the opportunity if I could now just to tell people that if they have an interest in Panel 5, I expect to have copies of Mr. Eliesen's speech here tomorrow, and if they could see Mrs. Formusa.

It does give an overview of kind of the current state of affairs with respect to non-utility generation matters. And obviously those matters will be reflected in our direct testimony. I thought it might be useful for people to have it prior to the scoping session on Monday.

THE CHAIRMAN: Thank you.

Mr. Greenspoon.

MR. GREENSPOON: Just a few questions, Mr. Chairman.

Q. On Exhibit 94, The Negawatt Revolution -- now there are two negawatt revolutions and one is Exhibit 94 and one is Exhibit 195. It is Exhibit 94 I want to turn to first.

On page 19 --

THE CHAIRMAN: Just a moment. I am not sure, was that one of the ones you told us about?

MR. GREENSPOON: Yes, sir.

THE CHAIRMAN: I have got it.

MR. GREENSPOON: It has a picture of a light bulb and it says "The Negawatt", and I guess they were facing pages.

Q. If you could turn to the facing page 19, just a couple of technologies, Mr. Burke, that I wanted to ask you about, whether they are in your

forecast. Or perhaps Ms. Fraser, these would be better directed at you.

I was looking to see if Mr. Campbell's copy was underlined like mine. But about two-thirds of the way down on the left-hand column, there is a paragraph that starts "Other improvements can boost...." The one I am interested in is the last part of the sentence:

"...half-watt electroluminescent panels to replace 30-to-50-watt EXIT signs...."

Is that a technology that you have a program for?

MS. FRASER: A. Yes, it is.

Q. It is. Where is that? Is that in the PCRD?

A. It's not explicitly in the PCRD. It is part of the energy efficient lighting program, and we provide an incentive of $25 for any EXIT signs which are 5 watts or less. And currently in Ontario there is a manufacturer of LED EXIT signs which get, I think, down to less than a watt per half -- obviously most EXIT signs take two faces, so....

Q. Now on that same article --

A. And I might add that it is

manufactured in Parry Sound. It is almost in Northern Ontario.

Q. Well, we're not Northern chauvinists in this room.

A. Not at all.

Q. You are from Manitoulin Island, aren't you?

A. Yes.

Q. I think that's in Northern Ontario.

A. Well, you said north of Highway 17, so I was--

Q. So that doesn't qualify.

A. --getting a little upset this morning.

Q. Further along, and again this is one of those articles that doesn't seem to have any pages, but there is a picture of, a couple of pages along, of a couple of pulleys.

I just wanted to ask you, this is another example, Ms. Fraser, of a substantial improvement:

> Belt-Tightening: Electric drives can be made 5 to 15 per cent more efficient by switching from V-belts on the top to synchronous belts, such as the Poly Chain GT on the bottom.

Those are technologies that you are promoting?

A. Yes. Both in accelerated paybacks and now in the new performance optimization program, those types of improvements can be....

Q. Right.

And Mr. Burke, these are then incorporated in your forecast?

MR. BURKE: A. I am not sure whether the belt drive technology is explicitly included in the forecasts at this point.

Q. On the next page there is a picture of a compact fluorescent bulb. And I wanted to get back to you, Mr. Shalaby, about this discount rate because it is something I am not really clear on. But if you look on the right-hand side of that page:

> "If you invest your own money to save energy in your business or home, you'll probably want it back within a couple of years, implying a real discount rate upward of 60 per cent a year. In contrast, if a utility has to build or expand a power plant to meet increased demand, it'll probably use a 20-year payback horizon, or about a 5 or 6 per

cent real annual discount rate. The utility's great technical and financial strengths, low information costs, diversified risk portfolio, and steady cash flow allow it to take a more relaxed view of investments than consumers can."

Now is there not a difference in the discount rate? I realize that your answer was that it is the same rate, but I am not clear on this concept of payback to the consumer, and clearly it is about 60 per cent, and how does that relate to the utilities' discount rate for supply?

MR. SHALABY: A. The answer I gave was we use the same discount rate in evaluating demand options as we do in evaluating supply options from the total customer cost perspective. The phenomenon described here is that from the customer perspective, things look differently than from a utility perspective. That is all that's saying.

If you value money at a discount rate higher than the utility does, the option would look different to you. And that is essentially what the program people face every day. People have a payback requirement of one year or two years. That is another way of stating a high discount rate hurdle, or hurdle

rate as we call it. So it is something that is dealt with in program design and in dealing with the customer --

Q. And further along, there is an example, the next paragraph, halfway through it, that Southern California Edison Company has given away more than 800,000 compact fluorescents because it was cheaper than operating their existing plants.

Are we going to see that in Ontario?

A. Maybe I will let Mr. MacLellan address this.

MR. MacLELLAN: A. I think the answer is you may see it if it's bundled with other programs. We find that compact fluorescents and the infrastructure required to give them away is not cost-effective according to our tests. However if we include them in a program such as an Espanola-type program or a home tune-up-type program, then yes, it would be cost-effective.

MR. BURKE: A. I would just like to add. As far as I recall, the total customer cost test levelized unit of energy cost for compact fluorescents was a number around 4.7 cents a kilowatthour, which is not likely to be less than the operating costs of our plant, so it's not quite parallel to the California

situation.

Q. If we could move on to Exhibit 195, which is the next paper called "The Negawatt Revolution". And on the second page, Ms. Fraser, I think I asked you this question before. But I just wonder if you can make a comment about the first point on the inside page:

> "New technologies for efficient end-use -- most of the best less than a year old -- can save twice as much electricity as five years ago, and at only a third the real cost."

Do you agree with that statement?

MS. FRASER: A. I haven't done an analysis of that type and I don't know enough about all of the technologies to do that kind of an assessment.

Q. There are two examples on the next page, the Southwire Corporation and Compaq Computer Corporation, what they did:

> "Southwire Corporation (the largest U.S. independent maker of rod, wire, and cable) cut its total energy use per ton of product by 50 per cent in eight years -- reducing electric use per ton by almost 40 per cent, gas use per ton by 60

per cent -- and is continuing to save even more, still with two-year paybacks."

Is that your experience in Ontario that there is potential for that kind of saving here?

A. There is definitely potential for saving. I don't know if we have comparable figures to deal with this. I am not as familiar with industrial as I am in commercial.

Q. Who is the industrial person on this panel?

A. I am speaking for industrial but I can just pull those commercial ones usually off the top of my head; industrial ones I have to look up.

So if we look at the Compaq Computer Corporation one, we are currently involved in a project in a major building downtown and we expect to cut somewhere between 25 and 30 per cent off their demand.

Q. So when Compaq cut their 30 per cent by mostly lighting improvements, that's not any different than some of these office buildings that we have in Toronto?

A. We are seeing that with one building; we don't see it with every building. We see some pretty significant changes, for instance, when we retrofit compact fluorescents into hallway lighting in

multi-residential buildings or things like that. They are pretty substantial there.

Q. On page 8480, this was Mr. Burke but I think maybe both Mr. Burke and Ms. Fraser should look at it.

THE CHAIRMAN: That is Volume 47, is it?

MR. GREENSPOON: I'm sorry, Volume 47:

"Hydro's potential EEI is estimated assuming production continues using the same industrial processes that we use today, but making each equipment type more efficient."

Q. The problem that I put to you, Mr. Burke or Ms. Fraser, that I am having with that and we in Northern Ontario, is that we are finding more and more of our technologies are not appropriate any more; that the steel industry is going to have to completely redesign their facility; that the pulp and paper industry is going to get into more recycling of paper, which is a lot less electrically intensive; the chlorine bleach is on the way out, it is much more electrically intensive.

Is that a reliable assumption then to base your EEI on given the very unstable situation in those industries?

MR. BURKE: A. To a certain extent we discussed in Panel 1 the changes in processes that we have implicit in the pulp and paper, the steel industry and the chemical industry. And the things that you have mentioned actually, for the pulp and paper industry, the shift toward more recycled fibre, and perhaps reduction in chlorine use, and so on are reflected in our forecast to the extent we can take that into account right now. That is in the basic load forecast. That is things we expect to see happening because of changes in the world that we are forecasting.

...

[4:02 p.m.] As far as efficiency improvement, then I suppose to a certain extent, if we are... The studies that were done by these consultants that are referred to in the transcript here may not have taken into account some of the changes in those industries.

Probably, though, if I had to say either way how their results would change, were they to be applied to the evolution of the industry as it is now in our 1990 load forecast, I would have to say that there would be less potential for conservation.

But again, strictly speaking, what we have said is that we are looking at equipment replacements with more efficient equipment. We are not looking at process changes, so where motors are used, they get replaced by more efficient motors and so on.

We have made no bones about the fact that there may be other opportunities and process changes yet to be identified and that studies are underway and hope to get at those.

Q. I wanted to ask you about a number of times when we talked about some of the Competitek information, you indicated that your numbers were often lower and some of the technologies that Competitek talked about, you didn't think were cost-effective or were economic at this point and I wanted to ask you

that if the avoided cost goes up, are some of these going to then become more economic, more cost-effective, meet the total customer cost test?

A. Well, there are lots of issues in using the Competitek information. Mr. Lovins is speaking to a U.S. market. Many places have cost of power 15 cents a kilowatthour. Things can appear attractive in those places that are a long way from attractive here.

He is not saying that these technologies have reached wide-scale use, at all. He has usually found an instance where they have been applied. It is not clear that the application generalizes to 100 per cent of the market.

All of these issues; we had great difficulty, in fact, determining where he gets some of his generalizations from and we are really looking forward to a chance to cross-examine him about the source of his information and where, how he gets his estimates because we have looked at--

Q. I am sure --

A. --a lot of this sort of material ourselves and we do not get, on a broad basis, anything like some of the savings he does. And as you may have observed in the Scientific American article you filed,

it is not just us; the Electric Power Research Institute doesn't come up with anything like the cost that he comes up with, so it will be interesting --

Q. Are you throwing down the gauntlet, Mr. Burke?

A. It will be very interesting for once to maybe have an opportunity to find out what lies behind some of these numbers--

Q. I am sure it will.

A. --because very often, we have not been able to when we have asked, find out where his cost estimates come from.

Q. Going back to my question, just dealing with... I know you really wanted to get that in.

A. Yes.

Q. But just dealing with the issue of avoided cost, if, assuming that he will be able to substantiate the numbers, if avoided cost goes up, some of these measures are going to be more attractive. They are going to be more economical, absolutely.

A. There is no doubt about it.

Q. All right. And you would be able to pay more in incentives to achieve those?

A. Yes.

Q. And I do not want to cover ground that Mr. Poch covered that. I think he covered that area.

I wanted to ask you a little bit about energy-efficient light bulbs.

I think it is you, Mr. Burke, and I cannot find the reference, but you said that if you counted the cost of the fixture, the compact fluorescent wouldn't be effective, at all. Was it you who said that?

A. Yes, I said that. I said that the margin that the compact fluorescent had, if it was used for I think the number of hours that we have assigned to the average light bulb was very low and that if you were to try to build in any more capital costs into the compact fluorescent, it would likely go over the total customer cost test.

This is, by the way, talking about the residential use of compact fluorescents.

Q. Right. That was what I was talking about. My question is that it is a technology I think that we all agree saves about 75 per cent of the energy, that it lasts about five times as long, it cuts the use of non-renewable fuels, it doesn't contribute greenhouse gases or nuclear wastes, and it gives the

same quality of light. Why is it not economic?

A. You mean, is there some physical reason why a compact fluorescent bulb costs more than an incandescent bulb?

Q. No. I mean, given all the environmental benefits of it and the technological benefits of how long it lasts and how more efficient it is, is there something wrong with your definition, Ontario Hydro's definition of "economic"?

A. The only thing that is not included in our analysis is any attribution of environmental benefits beyond the 10 per cent, but we have just agreed that the compact fluorescent is economic, so I am not quite sure what we are debating here.

Q. Well, we agreed it is economic, but only 4 and 5 per cent of the houses.

A. No. I think what we said was 15 per cent of the applications in a typical house would be useful without buying a new fixture and would also have the characteristics of length of use and so on that would make it economic.

You do have to use these bulbs at least two to four hours a day to justify their purchase.

Q. Well, to justify their purchase economically, but maybe psychologically. I mean, you

were the one in direct examination who said that there will always be people who will go out and do these things whether they are economic or not.

A. Absolutely.

Q. It is like Mr. Wilson burning wood. It is maybe not economic, but maybe he is contributing to the load reduction.

A. And polluting the environment at the same time.

Q. Well, not if he has a good stove.

A. Well, this is what we were debating before.

Q. Yes. But there are people, and we won't have to name them, but there are people who do not have any energy-efficient light bulbs in their home.

A. I am sure there are.

Q. You are sure there are. I am sure there are, too. I have talked to some of them in this room and there are people who have all energy-efficient light bulbs in their home.

A. Do you keep up-to-date on that?

Q. I haven't asked that question for a couple of weeks, no.

A. Yes. There probably are some people,

but frankly, they would be wasting resources if they put them in all of the light bulb, houses. They should better have spent their money on other conservation measures.

Q. But there is a psychological benefit, I can tell you.

A. Well, could be, but we are not working in that realm. That is clear.

Q. I see. All right. Well, I was going to ask all of you how many energy-efficient light bulbs you had in your house, but I am not going to.

MR. GREENSPOON: Those are all the questions I have. Thank you, Panel. Thank you.

THE CHAIRMAN: Thank you. Mr. Poch, you are next.

MR. H. POCH: Mr. Chairman, I believed in my latest conversation with my friend that his cross-examination would go all day today, and accordingly, the materials are only being put together for cross-examination in my office this afternoon and I would request that I be permitted to start tomorrow morning instead of this afternoon.

THE CHAIRMAN: That will be fine. Do you have any idea how long you are going to be?

MR. H. POCH: Half a day to

three-quarters of a day, Mr. Chairman, I believe.

THE CHAIRMAN: Thank you. Well then, we will adjourn until tomorrow morning at ten o'clock.

THE REGISTRAR: This hearing will adjourn until ten o'clock tomorrow morning.

---Whereupon the hearing was adjourned at 4:10 p.m. to be resumed on Thursday, September 12, 1991, at 10:00 a.m.

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